

## MATSUMOTO METRICS OF REVERSIBLE CURVATURE

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ABSTRACT. In this paper, we study the reversibility of Riemann curvature and Ricci curvature for the Matsumoto metric and prove three global results. First, we prove that a Matsumoto metric is  $R$ -reversible if and only if it is  $R$ -quadratic. Then we show that a Matsumoto metric is Ricci-reversible if and only if it is Ricci-quadratic. Finally, we prove that every weakly Einstein Matsumoto metric is Ricci-reversible.

### 1. INTRODUCTION

The class of  $(\alpha, \beta)$ -metrics was introduced by Matsumoto as extension of Randers and Kropina metrics [9]. An  $(\alpha, \beta)$ -metric is a Finsler metric on  $M$  defined by  $F := \alpha\phi(s)$ , where  $s = \beta/\alpha$ ,  $\phi = \phi(s)$  is a  $C^\infty$  function on the  $(-b_0, b_0)$  with certain regularity,  $\alpha$  is a Riemannian metric and  $\beta$  is a 1-form on  $M$  [3, 14, 15].

Recently, Crampin proved that a Randers metric  $F = \alpha + \beta$  has reversible geodesics if and only if  $\beta$  is parallel with respect to  $\alpha$  [2]. Then Masca-Sabau-Shimada investigate  $(\alpha, \beta)$ -metrics with reversible geodesics and projectively reversible geodesics [6, 7]. In general, the Finsler metrics might not be reversible. In spite of the non-reversibility of Finsler metrics, the geodesics and curvatures might be reversible.

In [11], Shen-Yang introduced the notions of  $R$ -reversibility and Ricci-reversibility. They proved that Randers metrics are  $R$ -reversible or Ricci-reversible if and only if they are  $R$ -quadratic or Ricci-quadratic, respectively. In this paper, we are going to study the reversibility of Riemann curvature and Ricci curvature for a Matsumoto metric  $F = \alpha^2/(\alpha - \beta)$  which is called by Matsumoto's slope-of-a-mountain metric, also. This metric was introduced by Matsumoto as a realization of Finsler's idea "a slope measure of a mountain with respect to a time measure" [12, 13]. He gave an exact formulation of a Finsler surface to measure the time on the slope of a hill and introduced the Matsumoto metrics in [8, 15].

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The Riemann curvature  $\mathbf{R}_y: T_x M \rightarrow T_x M$  is a family of linear maps on tangent spaces. A Finsler metric  $F$  on a manifold  $M$  is said to be R-quadratic if its Riemann curvature  $\mathbf{R}_y$  is quadratic in  $y \in T_x M$  [5][11]. The notion of R-quadratic metric was introduced by Shen [10].  $F$  is called R-reversible if  $\mathbf{R}_y = \mathbf{R}_{-y}$  (see [11]). A Finsler metric  $F$  is called Ricci-quadratic if its Ricci curvature  $\text{Ric}_y$ , is quadratic in  $y \in T_x M$ .  $F$  is called Ricci-reversible if  $\text{Ric}_y = \text{Ric}_{-y}$  (see [11]). In this paper, we have the two following theorems.

**Theorem 1.1.** *A Matsumoto metric is Ricci-reversible if and only if it is Ricci-quadratic.*

**Theorem 1.2.** *A Matsumoto metric is R-reversible if and only if it is R-quadratic.*

A Finsler metric on an  $n$ -dimensional manifold  $M$  is said to be of weakly Einsteinian if the Ricci curvature be in the form  $\mathbf{Ric} = (n-1)[3\theta F + \sigma F^2]$ , where  $\theta = \theta_i(x)y^i$  is a 1-form and  $\sigma = \sigma(x)$  is a scalar function on  $M$ .

**Theorem 1.3.** *Every weakly Einstein Matsumoto metric is Ricci reversible.*

## 2. PRELIMINARIES

An important class of Finsler metrics is so called  $(\alpha, \beta)$ -metrics, which are expressed in the form of  $F = \alpha\phi(s)$ ,  $s = \beta/\alpha$  where  $\alpha = \sqrt{a_{ij}(x)y^i y^j}$  is a Riemannian metric and  $\beta = b_i(x)y^i$  is a 1-form. Put

$$(1) \quad r_{ij} := \frac{1}{2}(b_{i|j} + b_{j|i}), \quad s_{ij} := \frac{1}{2}(b_{i|j} - b_{j|i}),$$

where  $'|'$  denotes the covariant derivative with respect to the Levi-Civita connection of  $\alpha$ . Let

$$r_j^i := a^{im}r_{mj}, \quad s_j^i := a^{im}s_{mj}, \quad r_j := b^m r_{mj}, \quad s_j := b^m s_{mj}, \quad r := b^i r_i,$$

where  $a^{ij} := (a_{ij})^{-1}$ ,  $b^i := a^{ij}b_j$ . We the subscript 0 means the contraction by  $y^i$ . Let  $G^i$  and  $\bar{G}^i$  be the geodesic coefficients of  $F$  and  $\alpha$  respectively. Then we have the following

**Lemma 2.1** ([4]). *Let  $G^i = G^i(x, y)$  and  $\bar{G}_\alpha^i = \bar{G}_\alpha^i(x, y)$  denote the coefficients of  $F$  and  $\alpha$  respectively in the same coordinate system. Then, we have*

$$(2) \quad G^i = \bar{G}^i + \alpha Q s^i_0 + \Psi(r_{00} - 2\alpha Q s_0)b^i + \frac{1}{\alpha}\Theta(r_{00} - 2\alpha Q s_0)y^i,$$

where

$$Q := \frac{\phi'}{\phi - s\phi'}, \quad \Psi := \frac{\phi''}{2[\phi - s\phi' + (b^2 - s^2)\phi'']}, \quad \Theta := \frac{\phi\phi' - s(\phi\phi'' + \phi'^2)}{2\phi[\phi - s\phi' + (b^2 - s^2)\phi'']}.$$

For a Matsumoto metric  $F = \frac{\alpha^2}{\alpha - \beta}$  and by a quite long computational procedure using Maple program, we obtain the following (see Proposition 3.1 in [1]).

**Lemma 2.2.** *Let  $F = \alpha^2/(\alpha - \beta)$  be a Matsumoto metric on a manifold  $M$ . Then the Riemannian curvature of  $F$  is given by*

$$(3) \quad R^i_j = \left( \frac{1}{4\alpha^4(\alpha - 3\beta + 2b^2\alpha)^4(\alpha - 2\beta)^3} \right) \sum_{k=0}^{13} t_k \alpha^k,$$

where  $\bar{R}^i_j$  is the Riemannian curvature of  $\alpha$  and  $t_k, k = 0, 1, \dots, 13$  are as follows

$$\begin{cases} t_0 := 2880y^i y_j r_{00}^2 \beta^7, \\ \vdots \\ t_{13} := 4(2b^2 + 1)^3 (-2s_k^i s_j^k b^2 - s_k^i s_j^k - 2s^i s_j + 2b^i s_m s_j^m) \end{cases}$$

All the coefficients of  $t_i$  are tedious, listed in Appendix 1.

By [1], we have the following.

**Lemma 2.3.** *The Ricci curvature of Matsumoto metric  $F = \alpha^2/(\alpha - \beta)$  is given by*

$$(4) \quad \text{Ric} = \left( \frac{1}{4\alpha^2(\alpha - 3\beta + 2b^2\alpha)^4(\alpha - 2\beta)^3} \right) \sum_{k=0}^{11} d_k \alpha^k$$

where  $\bar{\text{Ric}} := \bar{R}^m_m$  and  $d_k, k = 0, 1, \dots, 11$  are as follows

$$\begin{cases} d_0 := -288r_{00}^2(8n - 11)\beta^7. \\ \vdots \\ d_{11} := -4(1 + 2b^2)^3 (2s_m^i s_i^m b^2 + s_m^i s_i^m + 4s_m s^m) \end{cases}$$

All the coefficients of  $d_i$  are tedious, listed in Appendix 2.

### 3. PROOF OF THEOREM 1.1

*Proof of Theorem 1.1.* Let the Ricci curvature of  $F$  be reversible, i.e.,  $\text{Ric}(y) = \text{Ric}(-y)$ . Then by contracting both sides of (4) with  $4\alpha^2(\alpha - 3\beta + 2b^2\alpha)^4(\alpha - 2\beta)^3$  and by a quite long computational procedure using Maple program, we obtain

$$(5) \quad \sum_{i=0}^5 d'_{2i} \alpha^{2i} = 0,$$

where

$$d'_0 := 288(8n - 11)\beta^7 r_{00}^2.$$

All the coefficients of  $d'_{2i}$  are listed in Appendix 3. From (5), we know that  $\alpha^2$  divides  $d'_0$ . Since  $\alpha^2$  is an irreducible polynomial in  $y$ , it must be the case that  $\alpha^2$  divides  $r_{00}$ . Thus we have

$$r_{00} = c\alpha^2$$

for some function  $c = c(x)$ , i.e.,  $\beta$  is a conformal form with respect to  $\alpha$ . So it is easy to get the following

$$(6) \quad \begin{aligned} r_{00} &= c\alpha^2, \quad r_{0j} = cy_j, \quad r_i = cb_i, \quad r = cb^2, \quad r_j^i = c\delta_j^i, \\ r_{0k}s_0^k &= 0, \quad r_{0k}s^k = cs_0, \quad s_0^k r_k = cs_0, \quad r_{00|0} = c_0\alpha^2. \end{aligned}$$

Plugging above equations into (5) imply that

$$(7) \quad d_0'' + d_2''\alpha^2 + \cdots + d_8''\alpha^8 = 0,$$

where

$$d_0'' := -2592(\text{Ric} - \overline{\text{Ric}})\beta^7$$

and other coefficients of  $d_i''$  are listed in Appendix 4. By (7), we get

$$d_0'' = k\alpha^2$$

where  $k = k(x)$  is a scalar function on  $M$ . So we have

$$\text{Ric} = \overline{\text{Ric}} - k\alpha^2.$$

This shows that  $F$  is Ricci-quadratic.

Conversely, assume that the Ricci curvature of  $F$  is quadratic. Then by (4) we have

$$(8) \quad \begin{aligned} d_0' + d_2'\alpha^2 + \cdots + d_{10}'\alpha^{10} &= 0, \\ d_1' + d_3'\alpha^2 + \cdots + d_{11}'\alpha^{10} &= 0, \end{aligned}$$

where  $d_{2i}'$  are the same as Ricci-reversibility (since we only use coefficients of  $d_{2i}'$ , then we relinquish the coefficients of  $d_{2i+1}'$ ). Since (8) is the same as (5), by the same method we get

$$\text{Ric} = \overline{\text{Ric}} - k\alpha^2$$

which shows that  $F$  is Ricci-reversible.  $\square$

#### 4. PROOF OF THEOREM 1.2

*Proof of Theorem 1.2.* Let  $F$  be  $R$ -reversible,  $\mathbf{R}(y) = \mathbf{R}(-y)$ . Then by contracting both side (3) in  $4\alpha^4(\alpha - 3\beta + 2b^2\alpha)^4(\alpha - 2\beta)^3$  and using (6) and by a quite long computational procedure using Maple program, we obtain

$$(9) \quad \sum_{i=0}^6 t'_{2i}\alpha^{2i} = 0,$$

where

$$\begin{aligned} t'_0 &:= -288[10y^i y_j c^2 \beta^2 + 12y^i y_j c s_0 \beta + 17y^i y_j c_0 \beta + 16y^i y_j c_0 b^2 \beta - 16y^i y_j c^2 \beta^2 \\ &\quad + 4y^i y_j c^2 \beta^2) + 32y^i y_j s_0^2 b - 20y^i y_j c s_0 \beta - 8y^i y_j s_{0|0} b^2 - 6y^i y_j s_0^2 \\ &\quad - 10y^i y_j s_{0|0} - 4y^i c y_j s_0 \beta - 8y^i c y_j c \beta^2 - 24y^i c_0 y_j b^2 \beta - 24s_{0|0}^i y_j b^2 \beta \\ &\quad + 9(R_j^i - \overline{R}_j^i)\beta^2 - 2979s_0^i s_{0j}\beta^2 - 33y^i c_0 y_j \beta - 60s_{0|0}^i y_j \beta + 32y^i y_j c s_0 b \beta \\ &\quad + 32y^i c y_j s_0 b \beta + 32y^i c^2 y_j b \beta^2] \beta^5 \end{aligned}$$

and other coefficients of  $t'_i$  are listed in Appendix 5. By (9), it follows that  $\alpha^2$  divides  $t'_0$ , which is impossible. Therefore

$$t'_0 = 0$$

and we have

$$\begin{aligned} R^i_j := \bar{R}^i_j - \frac{1}{9} [ & 10y^i y_j c^2 - 16y^i y_j c^2 + 4y^i y_j c^2 - 8y^i y_j c^2 - 2979s_0^i s_{0j} + 32y^i c^2 y_j b \\ & + \frac{1}{\beta} (12y^i y_j c s_0 + 17y^i y_j c_0 + 16y^i y_j c_0 b^2 - 20y^i y_j c s_0 - 4y^i c y_j s_0 \\ (10) \quad & - 24y^i c_0 y_j b^2 - 24s_{0|0}^i y_j b^2 + 32y^i y_j c s_0 b - 33y^i c_0 y_j - 60s_{0|0}^i y_j + 32y^i c y_j s_0 b) \\ & + \frac{1}{\beta^2} (32y^i y_j s_0^2 b - 8y^i y_j s_{0|0} b^2 - 6y^i y_j s_0^2 - 10y^i y_j s_{0|0}) ]. \end{aligned}$$

This means that  $F$  is  $R$ -quadratic.

Conversely, let  $F$  be  $R$ -quadratic. Then by the same method we have

$$(11) \quad t'_0 + \cdots + t'_{12} \alpha^{10} = 0,$$

$$(12) \quad t'_1 + \cdots + t'_{13} \alpha^{12} = 0,$$

where coefficients of  $t'_i$  are listed in Appendix 5. (since we only use coefficients of  $t'_{2i}$ , then we relinquish the coefficients of  $t'_{2i+1}$ ). By (11), we get (10) which proves that  $F$  is  $R$ -reversible.  $\square$

## 5. PROOF OF THEOREM 1.3

*Proof of Theorem 1.3.* Let  $F$  be weakly Einstein

$$(13) \quad \mathbf{Ric} = (n-1)[3\theta F + \sigma F^2].$$

By substituting (4) in (13) and with a long computational procedure, using Maple program, we get

$$(14) \quad \frac{1}{4\alpha^2(\alpha - 3\beta + 2b^2\alpha)^4(\alpha - 2\beta)^3(\alpha - \beta)^2} \sum_{k=0}^{13} A_k \alpha^k = 0,$$

where

$$A_0 := -288\beta^9 r_{00}^2 (8n - 11),$$

and other coefficients of  $A_i$  are listed in Appendix 6. (14) is equivalent to the following equations

$$(15) \quad A_0 + A_2 \alpha^2 + \cdots + A_{12} \alpha^{12} = 0,$$

$$A_1 + A_3 \alpha^2 + \cdots + A_{13} \alpha^{12} = 0.$$

By (15), it follows that  $\alpha^2$  divides  $A_0$ . Since  $\alpha^2$  is an irreducible polynomial in  $y$ , it must be the case that  $\alpha^2$  divides  $r_{00}$ . Thus

$$r_{00} = c\alpha^2$$

for some function  $c = c(x)$ , i.e.,  $\beta$  is a conformal form with respect to  $\alpha$ . So it is easy to get

$$\begin{aligned} r_{00} &= c\alpha^2, \quad r_{0j} = cy_j, \quad r_i = cb_i, \quad r = cb^2, \quad r^i_j = c\delta_j^i, \\ r_{0k}s^k_0 &= 0, \quad r_{0k}s^k = cs_0, \quad s^k_0r_k = cs_0, \quad r_{00|0} = c_0\alpha^2. \end{aligned}$$

Plugging the above equations into (15) yields

$$(16) \quad \frac{1}{4\alpha^2(\alpha - 3\beta + 2b^2\alpha)^4(\alpha - 2\beta)^3(\alpha - \beta)^2} \sum_{k=0}^5 A'_{2k}\alpha^{2k} = 0,$$

where

$$A'_0 := 2592\beta^9 [\text{Ric} - \overline{\text{Ric}}]$$

and other coefficients of  $A'_{2i}$  are listed in Appendix 7.

By (16), it follows that  $\alpha^2$  must divide  $A'_0$ . So we have

$$\text{Ric} = \overline{\text{Ric}} - k\alpha^2,$$

where  $k = k(x)$  is a scalar function on  $M$ . Therefore,  $F$  is Ricci-reversible.  $\square$

## 6. APPENDIX 1: COEFFICIENTS IN (3)

$$\begin{aligned} t_0 &:= 2880y^i y_j r_{00}^2 \beta^7, \\ t_1 &:= -192y^i y_j \beta^6 (9r_{00|0}\beta + 28r_{00}^2 b^2 + 35r_{00}^2) \\ t_2 &:= 48\beta^5 (24y^i r_{j0} r_{00}\beta^2 - 48\delta_j^i r_{00}^2 \beta^2 + 18b^i y_j r_{00}^2 \beta + 72y^i y_j r_{00} s_0 \beta \\ &\quad + 102y^i y_j r_{00|0}\beta - 72y^i y_j r_{00} r_0 \beta - 36y^i b_j r_{00}^2 \beta + 96y^i y_j r_{00|0} b^2 \beta + 131y^i y_j r_{00}^2 \\ &\quad + 64y^i y_j r_{00}^2 b^4 + 222y^i y_j r_{00}^2 b^2) \\ t_3 &:= -48\beta^4 [154y^i y_j r_{00} s_0 \beta - 170y^i y_j r_{00} r_0 \beta + 230y^i y_j r_{00|0} b^2 \beta + 80y^i y_j r_{00|0} b^4 \beta \\ &\quad - 48y^i b_j r_{00}^2 b^2 \beta + 122y^i y_j r_{00|0}\beta + 144y^i y_j r_{0m} s_0^m \beta^2 - 36y^i y_j s_{0|0}\beta^2 \\ &\quad + 21b^i y_j r_{00}^2 \beta + 18b^i y_j r_{00|0}\beta^2 - 84y^i b_j r_{00}^2 \beta - 80\delta_j^i r_{00}^2 b^2 \beta^2 + 68y^i r_{j0} r_{00}\beta^2 \\ &\quad - 54y^i s_{j0} r_{00}\beta^2 - 112y^i y_j r_{00} r_0 b^2 \beta - 128y^i y_j r_{00} s_0 b^3 \beta + 128y^i y_j r_{00} s_0 b^2 \beta \\ &\quad - 40y^i y_j r_{00} s_0 b \beta - 40y^i y_j r_{00} r_0 b \beta - 128y^i y_j r_{00} r_0 b^3 \beta + 72y^i r_{00|j}\beta^3 \\ &\quad - 72y^i r_{j0|0}\beta^3 - 54s_{0|0} y_j \beta^3 - 124\delta_j^i r_{00}^2 \beta^2 - 36\delta_j^i r_{00|0}\beta^3 + 24b^i y_j r_{00}^2 b^2 \beta \\ &\quad + 16y^i r_{j0} r_{00} b^2 \beta^2 + 18r_{00}^i y_j r_{00}\beta^2 + 63y^i y_j r_{00}^2 + 120y^i y_j r_{00}^2 b^4 + 183y^i y_j r_{00}^2 b^2] \\ t_4 &:= 4\beta^3 (1152\delta_j^i r_{00} s_0 b \beta^3 + 1152\delta_j^i r_{00} r_0 b \beta^3 + 1270y^i y_j r_{00} s_0 \beta - 1964y^i y_j r_{00} r_0 \beta \\ &\quad + 2700y^i y_j r_{00|0} b^2 \beta + 1920y^i y_j r_{00|0} b^4 \beta + 2304y^i y_j s_0^2 b \beta^2 - 1440y^i y_j r_{00} s_0 \beta^2 \\ &\quad + 4032y^i y_j r_{0m} s_0^m b^2 \beta^2 - 576y^i y_j s_{0|0} b^2 \beta^2 - 384y^i b_j r_{00}^2 b^4 \beta - 648y^i b_j r_{00}^2 b^2 \beta \\ &\quad - 720y^i b_j r_{00} s_0 \beta^2 + 288y^i b_j r_{00} r_0 \beta^2 - 288y^i b_j r_{00|0} b^2 \beta^2 - 864y^i s_{j0} r_{00} b^2 \beta^2 \\ &\quad + 956y^i y_j r_{00|0}\beta - 432y^i y_j s_0^2 \beta^2 + 3744y^i y_j r_{0m} s_0^m \beta^2 - 720y^i y_j s_{0|0}\beta^2 \\ &\quad + 54b^i y_j r_{00}^2 \beta + 468b^i y_j r_{00|0}\beta^2 - 72b^i b_j r_{00}^2 \beta^2 - 894y^i b_j r_{00}^2 \beta - 36y^i b_j r_{00|0}\beta^2 \\ &\quad + 576y^i r_{j0} r_{00}\beta^3 + 720y^i s_{j0} r_{00}\beta^3 - 384\delta_j^i r_{00}^2 b^4 \beta^2 - 2352\delta_j^i r_{00}^2 b^2 \beta^2 \\ &\quad - 576\delta_j^i r_{00} s_0 \beta^3 - 288y^i r_{j0} s_0 \beta^3 + 960y^i r_{j0} r_{00}\beta^2 - 576y^i r_{j0} r_0 \beta^3 \\ &\quad + 1728y^i r_{00|j} b^2 \beta^3 - 1728y^i r_{j0|0} b^2 \beta^3 - 1728s_{0|0} y_j b^2 \beta^3 - 144b^i r_{j0} r_{00}\beta^3 \\ &\quad - 1404y^i s_{j0} r_{00}\beta^2 - 648\overline{R}_j^i \beta^4 - 214488s_0^i s_{0j} \beta^4 - 2672y^i y_j r_{00} r_0 b^2 \beta \end{aligned}$$

$$\begin{aligned}
& -3328y^i y_j r_{00} s_0 b^3 \beta + 2368y^i y_j r_{00} s_0 b^2 \beta - 976y^i y_j r_{00} s_0 b \beta - 976y^i y_j r_{00} r_0 b \beta \\
& -3328y^i y_j r_{00} r_0 b^3 \beta + 2304y^i y_j r_{00} s_0 b \beta^2 - 1024y^i y_j r_{00} s_0 b^5 \beta \\
& + 1024y^i y_j r_{00} s_0 b^4 \beta + 576\delta_j^i r_{00} r_0 \beta^3 - 864\delta_j^i r_{00|0} b^2 \beta^3 + 1128y^i y_j r_{00}^2 b^4 \\
& + 2376y^i r_{00|j} \beta^3 - 2376y^i r_{j0|0} \beta^3 - 2160s_{0|0}^i y_j \beta^3 - 1638\delta_j^i r_{00}^2 \beta^2 \\
& - 1188\delta_j^i r_{00|0} \beta^3 + 1050y^i y_j r_{00}^2 b^2 - 144b^i y_j r_{00} r_0 \beta^2 + 288b^i y_j r_{00|0} b^2 \beta^2 \\
& + 256y^i y_j r_{00|0} b^6 \beta - 2304y^i r_j r_{00} b \beta^3 + 504b^i y_j r_{00}^2 b^2 \beta + 144b^i y_j r_{00} s_0 \beta^2 \\
& - 1024y^i y_j r_{00} r_0 b^5 \beta - 512y^i y_j r_{00} r_0 b^4 \beta - 1152b^i y_j r_{00} s_0 b \beta^2 \\
& - 1152b^i y_j r_{00} r_0 b \beta^2 - 1152y^i b_j r_{00} s_0 b \beta^2 - 1152y^i b_j r_{00} r_0 b \beta^2 \\
& + 336y^i r_j r_{00} b^2 \beta^2 + 2304y^i r_{j0} s_0 b \beta^3 + 2304y^i r_{j0} r_0 b \beta^3 - 2304y^i s_j r_{00} b \beta^3 \\
& + 288r_0^i y_j r_{00} b^2 \beta^2 + 468r_0^i y_j r_{00} \beta^2 + 486\beta^2 s_0^i y_j r_{00} + 207y^i y_j r_{00}^2
\end{aligned}$$

$$\begin{aligned}
t_5 := & -4\beta^2 [972\beta^2 s_0^i y_j r_{00} b^2 - 1152\delta_j^i r_{00} s_0 b^2 \beta^3 + 2784\delta_j^i r_{00} s_0 b \beta^3 \\
& + 1536\delta_j^i r_{00} s_0 b^3 \beta^3 + 768\delta_j^i r_{00} r_0 b^2 \beta^3 + 2784\delta_j^i r_{00} r_0 b \beta^3 + 293y^i y_j r_{00} s_0 \beta \\
& - 982y^i y_j r_{00} r_0 \beta + 1374y^i y_j r_{00|0} b^2 \beta + 1488y^i y_j r_{00|0} b^4 \beta - 576y^i y_j s_0^2 b^2 \beta^2 \\
& + 3360y^i y_j s_0^2 b \beta^2 + 1536y^i y_j s_0^2 b^3 \beta^2 - 2568y^i y_j r_{00} s_0 \beta^2 + 7248y^i y_j r_{0m} s_0^m b^2 \beta^2 \\
& + 3072y^i y_j r_{0m} s_0^m b^4 \beta^2 - 696y^i y_j s_{0|0} b^2 \beta^2 - 192y^i y_j s_{0|0} b^4 \beta^2 - 3072y^i r_j r_{00} b^3 \beta^3 \\
& - 192b^i b_j r_{00}^2 b^2 \beta^2 - 480y^i b_j r_{00}^2 b^4 \beta + 84y^i b_j r_{00}^2 b^2 \beta - 1848y^i b_j r_{00} s_0 \beta^2 \\
& + 648y^i b_j r_{00} r_0 \beta^2 - 672y^i b_j r_{00|0} b^2 \beta^2 - 384y^i b_j r_{00|0} b^4 \beta^2 - 1260y^i s_j r_{00} b^2 \beta^2 \\
& - 288y^i s_j r_{00} \beta^2 b^4 + 367y^i y_j r_{00|0} \beta - 504y^i y_j s_0^2 \beta^2 + 3342y^i y_j r_{0m} s_0^m \beta^2 \\
& - 462y^i y_j s_{0|0} \beta^2 + 648b^i y_j s_{0|0} \beta^3 - 3b^i y_j r_{00}^2 \beta + 402b^i y_j r_{00|0} \beta^2 + 228b^i b_j r_{00}^2 \beta^2 \\
& - 216b^i b_j r_{00|0} \beta^3 + 432y^i b_j s_{0|0} \beta^3 - 351y^i b_j r_{00}^2 \beta - 78y^i b_j r_{00|0} \beta^2 \\
& + 1392y^i r_j r_{00} \beta^3 - 432y^i b_j r_{0m} s_0^m \beta^3 + 1728y^i s_j r_{00} \beta^3 - 864\delta_j^i r_{00}^2 b^4 \beta^2 \\
& - 2424\delta_j^i r_{00}^2 b^2 \beta^2 - 1008\delta_j^i r_{00} s_0 \beta^3 - 720y^i r_{j0} s_0 \beta^3 + 600y^i r_{j0} r_{00} \beta^2 \\
& - 1392y^i r_{j0} r_0 \beta^3 + 4176y^i r_{00|j} b^2 \beta^3 + 1152y^i r_{00|j} \beta^3 b^4 - 4176y^i r_{j0} b^2 \beta^3 \\
& - 1152y^i r_{j0|0} \beta^3 b^4 - 5184s_{0|0}^i y_j b^2 \beta^3 - 1728s_{0|0}^i y_j \beta^3 b^4 - 480b^i r_{j0} r_{00} \beta^3 \\
& - 648y^i s_j s_0 \beta^3 - 1206y^i s_j r_{00} \beta^2 - 324g^i y_j r_{00} \beta^3 + 1536\delta_j^i r_{00} r_0 b^3 \beta^3 \\
& - 1836\bar{R}_j^i \beta^4 + 39y^i y_j r_{00}^2 - 607716s_0^i s_{0j} \beta^4 - 2056y^i y_j r_{00} r_0 b^2 \beta \\
& - 2816y^i y_j r_{00} s_0 b^3 \beta + 1268y^i y_j r_{00} s_0 b^2 \beta - 776y^i y_j r_{00} s_0 b \beta - 776y^i y_j r_{00} r_0 b \beta \\
& - 2816y^i y_j r_{00} r_0 b^3 \beta - 2112y^i y_j r_{00} s_0 b^2 \beta^2 + 3360y^i y_j r_{00} s_0 b \beta^2 \\
& + 1536y^i y_j r_{00} s_0 b^3 \beta^2 - 1664y^i y_j r_{00} s_0 b^5 \beta + 1472y^i y_j r_{00} s_0 b^4 \beta \\
& + 1392\delta_j^i r_{00} r_0 \beta^3 - 2088\delta_j^i r_{00|0} b^2 \beta^3 - 576\delta_j^i r_{00|0} b^4 \beta^3 - 571968s_0^i s_{0j} b^2 \beta^4 \\
& + 432R_4 r_{j0} \beta^4 + 864y^i s_{0|j} \beta^4 + 432b^i r_{j0|0} \beta^4 - 432b^i r_{00|j} \beta^4 - 432r_j^i r_{00} \beta^4 \\
& - 864\delta_j^i r_{0m} s_0^m \beta^4 - 432\delta_j^i s_{0|0} \beta^4 + 2772y^i r_{00|j} \beta^3 - 2772y^i r_{j0|0} \beta^3 + 432y^i r_{k0} s_j^k \beta^4 \\
& - 864y^i r_{jk} s_0^k \beta^4 - 432y^i s_{j|0} \beta^4 - 2808s_{0|0}^i y_j \beta^3 - 1005\delta_j^i r_{00}^2 \beta^2 - 1386\delta_j^i r_{00|0} \beta^3 + 492y^i y_j r_{00}^2 b^4 \\
& + 324b^i s_j r_{00} \beta^3 - 264b^i y_j r_{00} r_0 \beta^2 + 528b^i y_j r_{00|0} b^2 \beta^2 + 96b^i y_j r_{00|0} b^4 \beta^2 + 416y^i y_j r_{00|0} b^6 \beta \\
& - 5568y^i r_j r_{00} b \beta^3 + 768y^i r_j r_{00} \beta^3 b^2 + 372b^i y_j r_{00}^2 b^2 \beta - 672b^i y_j r_{00} s_0 \beta^2 - 1664y^i y_j r_{00} r_0 b^5 \beta \\
& - 832y^i y_j r_{00} r_0 b^4 \beta + 384b^i y_j r_{00} s_0 b^2 \beta^2 - 2112b^i y_j r_{00} s_0 b \beta^2 - 768b^i y_j r_{00} s_0 b^3 \beta^2 - 96b^i y_j r_{00} r_0 b^2 \beta^2 \\
& + - 2112b^i y_j r_{00} r_0 b \beta^2 - 768b^i y_j r_{00} r_0 b^3 \beta^2 - 672y^i b_j r_{00} s_0 b^2 \beta^2 - 2304y^i b_j r_{00} s_0 b \beta^2 + 351y^i y_j r_{00}^2 b^2 \\
& + 576y^i b_j r_{00} r_0 b^2 \beta^2 - 2304y^i b_j r_{00} r_0 b \beta^2 + 144y^i r_{j0} r_{00} b^2 \beta^2 - 96y^i r_{j0} r_{00} \beta^2 b^4 + 5568y^i r_{j0} s_0 b \beta^3 \\
& + 5568y^i r_{j0} r_0 b \beta^3 - 576y^i r_{j0} s_0 b^2 \beta^3 + 3072y^i r_{j0} s_0 b^3 \beta^3 - 768y^i r_{j0} r_0 b^2 \beta^3 + 3072y^i r_{j0} r_0 b^3 \beta^3 \\
& - 96b^i r_{j0} r_{00} \beta^3 b^2 - 5568y^i s_j r_{00} b \beta^3 + 864y^i s_j r_{00} \beta^3 b^2 - 3072y^i s_j r_{00} b^3 \beta^3 + 528r_0^i y_j r_{00} b^2 \beta^2
\end{aligned}$$

$$\begin{aligned}
& +96r_0^i y_j r_{00} \beta^2 b^4 + 648r_0^i y_j s_0 \beta^3 + 402r_0^i y_j r_{00} \beta^2 - 216r_0^i b_j r_{00} \beta^3 + 729\beta^2 s_0^i y_j r_{00} - 1728\bar{R}_j^i \beta^4 b^2] \\
t_6 := & -\beta[-4536\beta^2 s_0^i y_j r_{00} b^2 - 2592\beta^2 s_0^i y_j r_{00} b^4 + 9216y^i r_j s_0 b \beta^4 + 8576\delta_j^i r_{00} s_0 b^2 \beta^3 \\
& -11072\delta_j^i r_{00} s_0 b \beta^3 - 12800\delta_j^i r_{00} s_0 b^3 \beta^3 - 6400\delta_j^i r_{00} r_0 b^2 \beta^3 - 11072\delta_j^i r_{00} r_0 b \beta^3 \\
& +24y^i y_j r_{00} s_0 \beta + 1068y^i y_j r_{00} r_0 \beta - 1524y^i y_j r_{00|0} b^2 \beta - 2208y^i y_j r_{00|0} b^4 \beta + 2976y^i y_j s_0^2 b^2 \beta^2 \\
& -7104y^i y_j s_0^2 b \beta^2 - 6144y^i y_j s_0^2 b^3 \beta^2 + 7152y^i y_j r_0 s_0 \beta^2 - 1152y^i y_j s_m s_0^m b^2 \beta^3 - 20400y^i y_j r_{0m} s_0^m b^2 \beta^2 \\
& -17664y^i y_j r_{0m} s_0^m b^4 \beta^2 + 1104y^i y_j s_{0|0} b^2 \beta^2 + 384y^i y_j s_{0|0} b^4 \beta^2 + 4096y^i r_j r_{00} b^5 \beta^3 - 2888b^i b_j r_{00} s_0 \beta^3 \\
& +25600y^i r_j r_{00} b^3 \beta^3 + 1152b^i y_j r_{0m} s_0^m b^2 \beta^3 - 4608b^i y_j s_{0|0} b^2 \beta^3 + 864b^i b_j r_{00}^2 b^2 \beta^2 - 576b^i b_j r_{00} r_0 \beta^3 \\
& +1152b^i b_j r_{00|0} b^2 \beta^3 + 512y^i b_j r_{00|0} b^6 \beta^2 + 576y^i b_j r_{00}^2 b^4 \beta - 1512y^i b_j r_{00}^2 b^2 \beta + 6056y^i b_j r_{00} s_0 \beta^2 \\
& -2320y^i b_j r_{00} r_0 \beta^2 + 2496y^i b_j r_{00|0} b^2 \beta^2 + 2880y^i b_j r_{00|0} b^4 \beta^2 + 9216y^i b_j s_0^2 b \beta^3 - 2304y^i b_j r_0 s_0 \beta^3 \\
& +5760y^i b_j r_{0m} s_0^m b^2 \beta^3 - 2304y^i b_j s_{0|0} b^2 \beta^3 + 2160y^i s_j r_{00} b^2 \beta^2 + 3456y^i s_j s_0 b^2 \beta^3 + 2880g^i y_j r_{00} \beta^3 b^2 \\
& +1296s_k^i s_0^k y_j \beta^4 - 1728b^i s_j r_{00} \beta^3 b^2 - 4608b^i r_j r_{00} b \beta^4 - 330y^i y_j r_{00|0} \beta + 1992y^i y_j s_0^2 \beta^2 \\
& -576y^i y_j s_m s_0^m \beta^3 - 6276y^i y_j r_{0m} s_0^m \beta^2 + 564y^i y_j s_{0|0} \beta^2 - 4464b^i y_j s_{0|0} \beta^3 - 108b^i y_j r_{00}^2 \beta \\
& -684b^i y_j r_{00|0} \beta^2 - 864b^i y_j s_0^2 \beta^3 + 144b^i y_j r_{0m} s_0^m \beta^3 - 2376b^i b_j r_{00}^2 \beta^2 + 1872b^i b_j r_{00|0} \beta^3 \\
& -2880y^i b_j s_{0|0} \beta^3 + 162y^i b_j r_{00}^2 \beta + 268y^i b_j r_{00|0} \beta^2 + 3456r_j^i r_{00} b^2 \beta^4 + 1152b^i r_j r_{00} \beta^4 \\
& -5536y^i r_j r_{00} \beta^3 - 2304y^i r_j s_0 \beta^4 + 3312y^i b_j r_{0m} s_0^m \beta^3 + 1440b^i s_j r_{00} \beta^4 - 6784y^i s_j r_{00} \beta^3 \\
& -1728y^i s_j s_0 \beta^4 + 1152y^i s_j r_0 \beta^4 + 1944s_0^i b_j r_{00} \beta^3 + 512\delta_j^i r_{00|0} b^6 \beta^3 + 3168\delta_j^i r_{00}^2 b^4 \beta^2 \\
& +5424\delta_j^i r_{00}^2 b^2 \beta^2 + 2768\delta_j^i r_{00} s_0 \beta^3 - 4608\delta_j^i s_0^2 b \beta^4 - 2304\delta_j^i r_0 s_0 \beta^4 + 6912\delta_j^i r_{0m} s_0^m b^2 \beta^4 \\
& +3456\delta_j^i s_{0|0} b^2 \beta^4 + 3040y^i r_j s_0 \beta^3 - 840y^i r_j r_{00} \beta^2 + 5536y^i r_j r_0 \beta^3 - 16608y^i r_{00|j} b^2 \beta^3 \\
& -9600y^i r_{00|j} \beta^3 b^4 - 1024y^i r_{00|j} b^6 \beta^3 + 16608y^i r_j r_{00} b^2 \beta^3 + 9600y^i r_j r_{00} \beta^3 b^4 + 1024y^i r_j r_{00} b^6 \beta^3 \\
& -3456y^i r_{k0} s_j^k b^2 \beta^4 + 6912y^i r_{kj} s_0^k b^2 \beta^4 + 3456y^i s_{j|0} b^2 \beta^4 + 23040s_{0|0} y_j b^2 \beta^3 + 18432s_{0|0} y_j \beta^3 b^4 \\
& +3072s_{0|0} y_j b^6 \beta^3 - 6912y^i s_{0|j} b^2 \beta^4 + 2592b^i r_j r_{00} \beta^3 - 576b^i r_j s_0 \beta^4 - 1152b^i r_j r_0 \beta^4 \\
& -3456b^i r_j r_{00} b^2 \beta^4 + 3456b^i r_{00|j} b^2 \beta^4 + 5616y^i s_j s_0 \beta^3 + 2052y^i s_j r_{00} \beta^2 + 2304g^i y_j r_{00} \beta^3 \\
& -12800\delta_j^i r_{00} r_0 b^3 \beta^3 - 4608\delta_j^i r_0 s_0 b \beta^4 - 2048\delta_j^i r_{00} s_0 b^5 \beta^3 + 2048\delta_j^i r_{00} s_0 b^4 \beta^3 - 2048\delta_j^i r_{00} r_0 b^5 \beta^3 \\
& +8856\bar{R}_j^i \beta^4 + 2931336s_0^i s_{0j} \beta^4 + 1296s_{j|0}^i \beta^5 - 2592s_{j|0}^i \beta^5 + 3024y^i y_j r_{00} r_0 b^2 \beta + 4608y^i y_j r_{00} s_0 b^3 \beta \\
& -1584y^i y_j r_{00} s_0 b^2 \beta + 1200y^i y_j r_{00} s_0 b \beta + 1200y^i y_j r_{00} r_0 b \beta + 4608y^i y_j r_{00} r_0 b^3 \beta + 12096y^i y_j r_{00} s_0 b^2 \beta^2 \\
& -7104y^i y_j r_{00} s_0 b \beta^2 - 6144y^i y_j r_{00} s_0 b^3 \beta^2 + 3840y^i y_j r_{00} s_0 b^5 \beta - 3264y^i y_j r_{00} s_0 b^4 \beta - 5536\delta_j^i r_{00} r_0 \beta^3 \\
& +8304\delta_j^i r_{00|0} b^2 \beta^3 + 4800\delta_j^i r_{00|0} b^4 \beta^3 + 5719680s_0^i s_{0j} b^2 \beta^4 + 2287872s_0^i s_{0j} \beta^4 b^4 \\
& -4320r_0^i r_{j0} \beta^4 - 7776y^i s_{0|j} \beta^4 - 4320b^i r_j r_{00} \beta^4 + 4320b^i r_{00|j} \beta^4 - 1296s_{0|0}^i b_j \beta^4 + 4320r_j^i r_{00} \beta^4 \\
& +7776\delta_j^i r_{0m} s_0^m \beta^4 + 3888\delta_j^i s_{0|0} \beta^4 - 7112y^i r_{00|j} \beta^3 + 7112y^i r_{j0|0} \beta^3 - 3888y^i r_{k0} s_j^k \beta^4 \\
& +7776y^i r_{kj} s_0^k \beta^4 + 3888y^i s_{j|0} \beta^4 + 7620s_{0|0}^i y_j \beta^3 + 1506\delta_j^i r_{00}^2 \beta^2 + 3556\delta_j^i r_{00|0} \beta^3 \\
& -3456b^i s_j r_{00} \beta^3 - 576b^i y_j r_{00} s_0 \beta^3 + 9216b^i y_j s_0^2 b \beta^3 + 720b^i y_j r_{00} r_0 \beta^2 - 1440b^i y_j r_{00|0} b^2 \beta^2 \\
& -576b^i y_j r_{00|0} b^4 \beta^2 - 960y^i y_j r_{00|0} b^6 \beta + 22144y^i r_j r_{00} b \beta^3 - 6400y^i r_j r_{00} \beta^3 b^2 - 1024y^i r_j r_{00} \beta^3 b^4 \\
& -648b^i y_j r_{00}^2 b^2 \beta + 3816b^i y_j r_{00} s_0 b^2 \beta + 3840y^i y_j r_{00} r_0 b^5 \beta + 1920y^i y_j r_{00} r_0 b^4 \beta + 3072y^i y_j r_{00} s_0 b^4 \beta^2 \\
& +288b^i y_j r_{00} s_0 b^2 \beta^2 + 5760b^i y_j r_{00} s_0 b \beta^2 + 4608b^i y_j r_{00} s_0 b^3 \beta^2 + 576b^i y_j r_{00} r_0 b^2 \beta^2 + 5760b^i y_j r_{00} r_0 b \beta^2 \\
& +4608b^i y_j r_{00} r_0 b^3 \beta^2 + 9216b^i y_j r_0 s_0 b \beta^3 - 4608b^i b_j r_{00} s_0 b \beta^3 - 4608b^i b_j r_{00} r_0 b \beta^3 + 2336y^i b_j r_{00} s_0 b^2 \beta^2 \\
& +7168y^i b_j r_{00} s_0 b \beta^2 - 512y^i b_j r_{00} s_0 b^3 \beta^2 - 4288y^i b_j r_{00} r_0 b^2 \beta^2 + 7168y^i b_j r_{00} r_0 b \beta^2 - 512y^i b_j r_{00} r_0 b^3 \beta^2 \\
& +9216y^i b_j r_{00} s_0 b \beta^3 - 2048y^i b_j r_{00} s_0 b^5 \beta^2 + 2048y^i b_j r_{00} s_0 b^4 \beta^2 - 2048y^i b_j r_{00} r_0 b^5 \beta^2 \\
& -1024y^i b_j r_{00} r_0 b^4 \beta^2 - 1024\delta_j^i r_{00} r_0 b^4 \beta^3 + 288y^i r_j r_{00} b^2 \beta^2 + 768y^i r_j r_{00} \beta^2 b^4 - 22144y^i r_{j0} s_0 b \beta^3 \\
& -22144y^i r_{j0} r_0 b \beta^3 + 5440y^i r_{j0} s_0 b^2 \beta^3 - 25600y^i r_{j0} s_0 b^3 \beta^3 + 6400y^i r_{j0} r_0 b^2 \beta^3 - 25600y^i r_{j0} r_0 b^3 \beta^3 \\
& +1024y^i r_{j0} s_0 \beta^3 b^4 - 4096y^i r_{j0} s_0 b^5 \beta^3 + 1024y^i r_{j0} r_0 b^4 \beta^3 - 4096y^i r_{j0} r_0 b^5 \beta^3 + 1152b^i r_{j0} r_{00} \beta^3 b^2
\end{aligned}$$



$$\begin{aligned}
& +4608b^i r_{j0} s_0 b \beta^4 + 4608b^i r_{j0} r_0 b \beta^4 - 4608b^i s_j r_{00} b \beta^4 + 22144y^i s_j r_{00} b \beta^3 - 6880y^i s_j r_{00} \beta^3 b^2 \\
& -1024y^i s_j r_{00} \beta^3 b^4 + 25600y^i s_j r_{00} b^3 \beta^3 + 4096y^i s_j r_{00} b^5 \beta^3 + 4608y^i s_j s_0 b \beta^4 - 4608y^i s_j r_0 b \beta^4 \\
& -3072y^i y_j r_{0m} s_0^m b^6 \beta^2 - 1440r_0^i y_j r_{00} b^2 \beta^2 - 576r_0^i y_j r_{00} \beta^2 b^4 - 4608r_0^i y_j s_0 b^2 \beta^3 + 1152r_0^i b_j r_{00} \beta^3 b^2 \\
& -3456r_0^i r_{j0} b^2 \beta^4 - 4464r_0^i y_j s_0 \beta^3 - 684r_0^i y_j r_{00} \beta^2 + 1872r_0^i b_j r_{00} \beta^3 - 1944\beta^3 s_0^i y_j s_0 \\
& -1620\beta^2 s_0^i y_j r_{00} + 6912\bar{R}_j \beta^4 b^4 - 27y^i y_j r_{00}^2 - 504y^i y_j r_{00}^2 b^4 - 324y^i y_j r_{00}^2 b^2 + 17280\bar{R}_j \beta^4 b^2] \\
t_7 := & -1728\beta^2 s_0^i y_j r_{00} b^2 - 3888\beta^3 s_0^i y_j s_0 b^2 - 2160\beta^2 s_0^i y_j r_{00} b^4 - 576\beta^2 s_0^i y_j r_{00} b^6 - 3072y^i r_j s_0 b^2 \beta^4 \\
& +17664y^i r_j s_0 b \beta^4 + 12288y^i r_j s_0 b^3 \beta^4 + 6656\delta_j^i r_{00} s_0 b^2 \beta^3 - 5792\delta_j^i r_{00} s_0 b \beta^3 - 10496\delta_j^i r_{00} s_0 b^3 \beta^3 \\
& -5248\delta_j^i r_{00} r_0 b^2 \beta^3 - 5792\delta_j^i r_{00} r_0 b \beta^3 - 1536y^i y_j s_m s_0^m b^4 \beta^3 + 16y^i y_j r_{00} s_0 \beta - 9120y^i y_j r_{0m} s_0^m b^4 \beta^2 \\
& +148y^i y_j r_{00} r_0 \beta - 216y^i y_j r_{00|0} b^2 \beta - 384y^i y_j r_{00|0} b^4 \beta + 2272y^i y_j s_0^2 b^2 \beta^2 - 1600y^i y_j s_0^2 b \beta^2 \\
& -1792y^i y_j s_0^2 b^3 \beta^2 + 2416y^i y_j r_0 s_0 \beta^2 - 2400y^i y_j s_m s_0^m b^2 \beta^3 - 6984y^i y_j r_{0m} s_0^m b^2 \beta^2 + 144y^i y_j s_{0|0} b^2 \beta^2 \\
& -96y^i y_j s_{0|0} b^4 \beta^2 + 7168y^i r_j r_{00} b^5 \beta^3 + 20992y^i r_j r_{00} b^3 \beta^3 + 1824b^i y_j r_{0m} s_0^m b^2 \beta^3 + 1536b^i y_j r_{0m} s_0^m b^4 \beta^3 \\
& -6432b^i y_j s_{0|0} b^2 \beta^3 - 2688b^i y_j s_{0|0} b^4 \beta^3 + 144b^i b_j r_{00}^2 b^2 \beta^2 - 5136b^i b_j r_{00} s_0 \beta^3 - 1056b^i b_j r_{00} r_0 \beta^3 \\
& +2112b^i b_j r_{00|0} b^2 \beta^3 + 384b^i b_j r_{00|0} b^4 \beta^3 + 768y^i b_j r_{00|0} b^6 \beta^2 - 96y^i b_j r_{00}^2 b^4 \beta - 684y^i b_j r_{00}^2 b^2 \beta \\
& +1908y^i b_j r_{00} s_0 \beta^2 - 1032y^i b_j r_{00} r_0 \beta^2 + 1152y^i b_j r_{00|0} b^2 \beta^2 + 2016y^i b_j r_{00|0} b^4 \beta^2 - 1152y^i b_j s_0^2 b^2 \beta^3 \\
& +13440y^i b_j s_0^2 b \beta^3 + 6144y^i b_j s_0^2 b^3 \beta^3 - 3648y^i b_j r_0 s_0 \beta^3 + 9120y^i b_j r_{0m} s_0^m b^2 \beta^3 + 5376y^i b_j r_{0m} s_0^m b^4 \beta^3 \\
& -2784y^i b_j s_{0|0} b^2 \beta^3 - 768y^i b_j s_{0|0} b^4 \beta^3 - 36y^i s_j r_{00} b^2 \beta^2 - 576y^i s_j r_{00} b^6 \beta^2 - 1440y^i s_j r_{00} \beta^2 b^4 \\
& +5904y^i s_j s_0 b^2 \beta^3 + 1152y^i s_j s_0 b^3 \beta^4 + 4128s^i y_j r_{00} \beta^3 b^2 + 2052s_k^i s_0^k y_j \beta^4 + 2112s^i y_j r_{00} \beta^3 b^4 \\
& -4032b^i s_j r_{00} \beta^3 b^2 - 576b^i s_j r_{00} \beta^3 b^4 + 1536b^i r_j r_{00} b^2 \beta^4 - 9984b^i r_j r_{00} b \beta^4 - 128y^i y_j s_0^2 b^4 \beta^2 \\
& -40y^i y_j r_{00|0} \beta + 1096y^i y_j s_0^2 \beta^2 - 708y^i y_j s_m s_0^m \beta^3 - 1628y^i y_j r_{0m} s_0^m \beta^2 + 80y^i y_j s_{0|0} \beta^2 \\
& -2976b^i y_j s_{0|0} \beta^3 - 72b^i y_j r_{00}^2 \beta - 144b^i y_j r_{00|0} \beta^2 + 1488b^i y_j s_0^2 \beta^3 - 1728b^i y_j s_m s_0^m \beta^4 \\
& +312b^i y_j r_{0m} s_0^m \beta^3 - 1836b^i b_j r_{00}^2 \beta^2 + 1608b^i b_j r_{00|0} \beta^3 + 864b^i b_j r_{0m} s_0^m \beta^4 + 1728b^i b_j s_{0|0} \beta^4 \\
& -1848y^i b_j s_{0|0} \beta^3 - 39y^i b_j r_{00}^2 \beta + 114y^i b_j r_{00|0} \beta^2 + 2016y^i b_j s_0^2 \beta^3 - 432s^i b_j r_{00} \beta^4 + 7488r_j^i r_{00} b^2 \beta^4 \\
& +2304r_j^i r_{00} b^4 \beta^4 + 2496b^i r_j r_{00} \beta^4 - 2896y^i r_j r_{00} \beta^3 - 4416y^i r_j s_0 \beta^4 - 864y^i b_j s_m s_0^m \beta^4 \\
& +2568y^i b_j r_{0m} s_0^m \beta^3 + 3312b^i s_j r_{00} \beta^4 - 3472y^i s_j r_{00} \beta^3 - 3264y^i s_j s_0 \beta^4 + 2208y^i s_j r_0 \beta^4 \\
& +3456s_k^i s_0^k y_j b^2 \beta^4 + 2916s_0^i b_j r_{00} \beta^3 + 2304\delta_j^i s_{0|0} \beta^4 b^4 + 4608\delta_j^i r_{0m} s_0^m b^4 \beta^4 + 896\delta_j^i r_{00|0} b^6 \beta^3 \\
& +768\delta_j^i s_0^2 b^2 \beta^4 - 6144\delta_j^i s_0^2 b^3 \beta^4 + 1488\delta_j^i r_{00}^2 b^4 \beta^2 + 1752\delta_j^i r_{00}^2 b^2 \beta^2 + 992\delta_j^i r_{00} s_0 \beta^3 - 8832\delta_j^i s_0^2 b \beta^4 \\
& -4416\delta_j^i r_{00} s_0 \beta^4 + 13248\delta_j^i r_{0m} s_0^m b^2 \beta^4 + 6624\delta_j^i s_{0|0} b^2 \beta^4 + 1744y^i r_{j0} s_0 \beta^3 - 156y^i r_{j0} r_{00} \beta^2 \\
& +2896y^i r_{j0} r_0 \beta^3 - 8688y^i r_{00|j} b^2 \beta^3 - 7872y^i r_{00|j} \beta^3 b^4 - 1792y^i r_{00|j} b^6 \beta^3 + 8688y^i r_{j0|0} b^2 \beta^3 \\
& +7872y^i r_{j0|0} \beta^3 b^4 + 1792y^i r_{j0|0} b^6 \beta^3 - 6624y^i r_{k0} s_j^k b^2 \beta^4 - 2304y^i r_{k0} s_j^k \beta^4 b^4 + 13248y^i r_{jk} s_0^k b^2 \beta^4 \\
& +4608y^i r_{jk} s_0^k \beta^4 b^4 + 6624y^i s_{j|0} b^2 \beta^4 + 2304y^i s_{j|0} \beta^4 b^4 + 12640s_{0|0}^i y_j b^2 \beta^3 + 16896s_{0|0}^i y_j \beta^3 b^4 \\
& +7168s_{0|0}^i y_j b^6 \beta^3 + 512s_{0|0}^i y_j \beta^3 b^8 - 13248y^i s_{0|j} b^2 \beta^4 - 4608y^i s_{0|j} \beta^4 b^4 + 1824b^i r_{j0} r_{00} \beta^3 \\
& -864b^i r_{j0} s_0 \beta^4 - 2496b^i r_{j0} r_0 \beta^4 - 7488b^i r_{j0|0} b^2 \beta^4 - 2304b^i r_{j0|0} \beta^4 b^4 + 7488b^i r_{00|j} b^2 \beta^4 \\
& +2304b^i r_{00|j} \beta^4 b^4 + 4284y^i s_j s_0 \beta^3 + 432y^i s_j r_{00} \beta^2 + 1644s^i y_j r_{00} \beta^3 + 432s^i y_j s_0 \beta^4 - 10496\delta_j^i r_{00} r_0 b^3 \beta^3 \\
& -8832\delta_j^i r_{00} s_0 b \beta^4 - 3584\delta_j^i r_{00} s_0 b^5 \beta^3 + 3584\delta_j^i r_{00} s_0 b^4 \beta^3 - 3584\delta_j^i r_{00} r_0 b^5 \beta^3 + 5892\bar{R}_j \beta^4 \\
& +1950252s_0^i s_{0j} \beta^4 + 3024s_{j|0}^i \beta^5 - 6048s_{j|0}^i \beta^5 + 520y^i y_j r_{00} r_0 b^2 \beta + 896y^i y_j r_{00} s_0 b^3 \beta \\
& -524y^i y_j r_{00} s_0 b^2 \beta + 224y^i y_j r_{00} s_0 b \beta + 224y^i y_j r_{00} r_0 b \beta + 896y^i y_j r_{00} r_0 b^3 \beta + 6208y^i y_j r_{00} s_0 b^2 \beta^2 \\
& -1600y^i y_j r_{00} s_0 b \beta^2 - 1792y^i y_j r_{00} s_0 b^3 \beta^2 + 896y^i y_j r_{00} s_0 b^5 \beta - 1040y^i y_j r_{00} s_0 b^4 \beta - 2896\delta_j^i r_{00} r_0 \beta^3 \\
& +4344\delta_j^i r_{00|0} b^2 \beta^3 + 3936\delta_j^i r_{00|0} b^4 \beta^3 - 864r_0^i s_j \beta^5 + 5910336s_0^i s_{0j} b^2 \beta^4 + 4957056s_0^i s_{0j} \beta^4 b^4 \\
& +1016832s_0^i s_{0j} \beta^4 b^6 - 4464r_0^i r_{j0} \beta^4 - 7200y^i s_{0|j} \beta^4 - 864b^i s_{j|0} \beta^5 - 864y^i s_m s_0^m \beta^5 + 3456s_{j|0}^i b^2 \beta^5 \\
& -6912s_{j|0}^i b^2 \beta^5 - 4464b^i r_{j0|0} \beta^4 + 4464b^i r_{00|j} \beta^4 - 2376s_{0|0}^i b_j \beta^4 + 4464r_j^i r_{00} \beta^4 + 1728r_j^i s_0 \beta^5
\end{aligned}$$

$$\begin{aligned}
& +7200\delta_j^i r_{0m} s_0^m \beta^4 + 3600\delta_j^i s_{0|0} \beta^4 + 1728\delta_j^i s_m s_0^m \beta^5 - 2708y^i r_{00|j} \beta^3 + 2708y^i r_{j0|0} \beta^3 - 3600y^i r_{k0} s_j^k \beta^4 \\
& +7200y^i r_{jk} s_0^k \beta^4 + 3600y^i s_{j|0} \beta^4 + 2960s_{0|0}^i y_j \beta^3 - 768\delta_j^i s_0^2 \beta^4 + 351\delta_j^i r_{00}^2 \beta^2 + 1354\delta_j^i r_{00|0} \beta^3 \\
& +1728b^i s_{0|j} \beta^5 + 864b^i r_{k0} s_j^k \beta^5 - 1728b^i r_{jk} s_0^k \beta^5 - 864s^i r_{j0} \beta^5 - 3492b^i s_j r_{00} \beta^3 - 1296b^i s_j s_0 \beta^4 \\
& -3456s_{0|0}^i b_j b^2 \beta^4 + 9216b^i y_j s_0^2 b^3 \beta^3 - 864b^i y_j r_{0s_0} \beta^3 - 1920b^i y_j s_0^2 b^2 \beta^3 + 12672b^i y_j s_0^2 b \beta^3 \\
& +216b^i y_j r_{00} r_0 \beta^2 - 432b^i y_j r_{00|0} b^2 \beta^2 - 288b^i y_j r_{00|0} b^4 \beta^2 - 224y^i y_j r_{00|0} b^6 \beta + 512y^i y_j s_0^2 b^5 \beta^2 \\
& -6144b^i r_j r_{00} b^3 \beta^4 + 11584y^i r_j r_{00} b \beta^3 - 5248y^i r_j r_{00} \beta^3 b^2 - 1792y^i r_j r_{00} \beta^3 b^4 - 180b^i y_j r_{00}^2 b^2 \beta \\
& +1404b^i y_j r_{00} s_0 \beta^2 + 896y^i y_j r_{00} r_0 b^5 \beta + 448y^i y_j r_{00} r_0 b^4 \beta + 512y^i y_j r_{00} s_0 b^5 \beta^2 + 3328y^i y_j r_{00} s_0 b^4 \beta^2 \\
& +864b^i y_j r_{00} s_0 b^2 \beta^2 + 1728b^i y_j r_{00} s_0 b \beta^2 + 2304b^i y_j r_{00} s_0 b^3 \beta^2 + 288b^i y_j r_{00} r_0 b^2 \beta^2 + 1728b^i y_j r_{00} r_0 b \beta^2 \\
& +2304b^i y_j r_{00} r_0 b^3 \beta^2 - 1152b^i y_j r_{00} s_0 b^2 \beta^3 + 12672b^i y_j r_{00} s_0 b \beta^3 + 9216b^i y_j r_{00} s_0 b^3 \beta^3 + 576b^i y_j r_{00} s_0 b^4 \beta^2 \\
& +960b^i b_j r_{00} s_0 b^2 \beta^3 - 8448b^i b_j r_{00} s_0 b \beta^3 - 3072b^i b_j r_{00} s_0 b^3 \beta^3 - 384b^i b_j r_{00} r_0 b^2 \beta^3 - 8448b^i b_j r_{00} r_0 b \beta^3 \\
& -3072b^i b_j r_{00} r_0 b^3 \beta^3 - 1440y^i b_j r_{00} s_0 b^2 \beta^2 + 2688y^i b_j r_{00} s_0 b \beta^2 - 768y^i b_j r_{00} s_0 b^3 \beta^2 - 2976y^i b_j r_{00} r_0 b^2 \beta^2 \\
& +2688y^i b_j r_{00} r_0 b \beta^2 - 768y^i b_j r_{00} r_0 b^3 \beta^2 - 3840y^i b_j r_{00} s_0 b^2 \beta^3 + 13440y^i b_j r_{00} s_0 b \beta^3 + 6144y^i b_j r_{00} s_0 b^3 \beta^3 \\
& -3072y^i b_j r_{00} s_0 b^5 \beta^2 + 1728y^i b_j r_{00} s_0 b^4 \beta^2 - 3072y^i b_j r_{00} r_0 b^5 \beta^2 - 1536y^i b_j r_{00} r_0 b^4 \beta^2 - 1792\delta_j^i r_{00} r_0 b^4 \beta^3 \\
& -3072\delta_j^i r_{0s_0} b^2 \beta^4 - 6144\delta_j^i r_{0s_0} b^3 \beta^4 + 336y^i r_{j0} r_{00} b^2 \beta^2 + 576y^i r_{j0} r_{00} \beta^2 b^4 - 11584y^i r_{j0} s_0 b \beta^3 \\
& -11584y^i r_{j0} r_0 b \beta^3 + 5152y^i r_{j0} s_0 b^2 \beta^3 - 20992y^i r_{j0} s_0 b^3 \beta^3 + 5248y^i r_{j0} r_0 b^2 \beta^3 - 20992y^i r_{j0} r_0 b^3 \beta^3 \\
& +2176y^i r_{j0} s_0 \beta^3 b^4 - 7168y^i r_{j0} s_0 b^5 \beta^3 + 1792y^i r_{j0} r_0 b^4 \beta^3 - 7168y^i r_{j0} r_0 b^5 \beta^3 + 1344b^i r_{j0} r_{00} \beta^3 b^2 \\
& -1152b^i r_{j0} s_0 b^2 \beta^4 + 9984b^i r_{j0} s_0 b \beta^4 + 6144b^i r_{j0} s_0 b^3 \beta^4 - 1536b^i r_{j0} r_0 b^2 \beta^4 + 9984b^i r_{j0} r_0 b \beta^4 \\
& +6144b^i r_{j0} r_0 b^3 \beta^4 + 1728b^i s_j r_{00} b^2 \beta^4 - 9984b^i s_j r_{00} b \beta^4 - 6144b^i s_j r_{00} b^3 \beta^4 + 11584y^i s_j r_{00} b \beta^3 \\
& -5296y^i s_j r_{00} \beta^3 b^2 - 1600y^i s_j r_{00} \beta^3 b^4 + 20992y^i s_j r_{00} b^3 \beta^3 + 7168y^i s_j r_{00} b^5 \beta^3 - 1920y^i s_j s_0 b^2 \beta^4 \\
& +8832y^i s_j s_0 b \beta^4 + 6144y^i s_j s_0 b^3 \beta^4 + 1536y^i s_j r_0 b^2 \beta^4 - 8832y^i s_j r_0 b \beta^4 - 6144y^i s_j r_0 b^3 \beta^4 \\
& -128y^i y_j s_{0|0} \beta^2 b^6 - 3328y^i y_j r_{0m} s_0^m b^6 \beta^2 + 3888s_0^i b_j r_{00} \beta^3 b^2 - 432r_0^i y_j r_{00} b^2 \beta^2 + 17856\bar{R}_j^i \beta^4 b^2 \\
& -288r_0^i y_j r_{00} \beta^2 b^4 - 6432r_0^i y_j s_0 b^2 \beta^3 - 2688r_0^i y_j s_0 b^3 \beta^4 + 2112r_0^i b_j r_{00} \beta^3 b^2 + 384r_0^i b_j r_{00} \beta^3 b^4 \\
& -7488r_0^i r_{j0} b^2 \beta^4 - 2304r_0^i r_{j0} b^4 \beta^4 - 2976r_0^i y_j s_0 \beta^3 - 144r_0^i y_j r_{00} \beta^2 + 1608r_0^i b_j r_{00} \beta^3 + 1728r_0^i b_j s_0 \beta^4 \\
& -1944\beta^3 s_0^i y_j s_0 - 396\beta^2 s_0^i y_j r_{00} + 14976\bar{R}_j^i \beta^4 b^4 + 3072\bar{R}_j^i \beta^4 b^6 - 3y^i y_j r_{00}^2 - 60y^i y_j r_{00}^2 b^4 - 36y^i y_j r_{00}^2 b^2
\end{aligned}$$

$$\begin{aligned}
t_8 := & 648s_k^i s_j^k \beta^5 - 773216s_0^i s_{0j} \beta^3 - 2916s_{j|0}^i \beta^4 + 5832s_{j|0}^i \beta^4 - 1620s_0^i b_j r_{00} \beta^2 + 1944y^i s_j r_{00} b^2 \beta^2 \\
& +864y^i s_j r_{00} \beta^2 b^4 + 2720y^i s_j s_0 b^2 \beta^3 + 512y^i s_j s_0 \beta^3 b^4 - 3296b^i s_j r_{00} \beta^3 b^2 - 512b^i s_j r_{00} \beta^3 b^4 \\
& +2384y^i s_j s_0 \beta^3 + 972y^i s_j r_{00} \beta^2 - 1864192s_0^i s_{0j} b^6 \beta^3 - 169472s_0^i s_{0j} \beta^3 b^8 + 2440r_0^i r_{j0} \beta^3 - 3456b^i s_{0|j} \beta^4 \\
& -3456r_j^i s_0 \beta^4 - 3024\delta_j^i s_m s_0^m \beta^4 + 1756y^i r_{k0} s_j^k \beta^3 - 2440b^i r_{00|j} \beta^3 + 1728s_{0|0}^i b_j \beta^3 - 1728b^i r_{k0} s_j^k \beta^4 \\
& -306\delta_j^i r_{00|0} \beta^2 + 1000\delta_j^i s_0^2 \beta^3 - 3512y^i r_{jk} s_0^k \beta^3 - 1756y^i s_{j|0} \beta^3 - 664s_{0|0}^i y_j \beta^2 - 1756\delta_j^i s_{0|0} \beta^3 \\
& -48\delta_j^i r_{00}^2 \beta + 3512y^i s_{0|j} \beta^3 + 1728b^i s_{j|0} \beta^4 + 1512y^i s_m s_0^m \beta^4 + 2y^i y_j r_{00|0} + 12b^i y_j r_{00}^2 + 9y^i b_j r_{00}^2 \\
& -2440r_j^i r_{00} \beta^3 + 612y^i r_{00|j} \beta^2 - 612y^i r_{j0|0} \beta^2 + 6912s_{j|0}^i b^4 b^4 + 2440b^i r_{j0|0} \beta^3 - 6912s_{j|0}^i b^2 \beta^4 \\
& -3456s_{j|0}^i \beta^4 b^4 + 3456b^i r_{jk} s_0^k \beta^4 + 13824s_{j|0}^i b^2 \beta^4 + 1728g^i r_{j0} \beta^4 - 3512\delta_j^i r_{0m} s_0^m \beta^3 - 3648y^i s_{j|0} \beta^3 b^4 \\
& -512y^i s_{j|0} b^6 \beta^3 - 3680s_{0|0}^i y_j b^2 \beta^2 + 3456b^i s_j s_0 \beta^3 + 1692b^i s_j r_{00} \beta^2 - 1476y^i s_j s_0 \beta^2 - 36y^i s_j r_{00} \beta \\
& -684b^i b_j r_{00|0} \beta^2 - 1584b^i b_j r_{0m} s_0^m \beta^3 - 1008y^i b_j r_{0m} s_0^m \beta^2 + 1024y^i s_{0|j} b^6 \beta^3 + 368b^i r_{j0} s_0 \beta^3 \\
& +564y^i b_j s_{0|0} \beta^2 - 8y^i y_j r_{00} r_0 - 236y^i y_j s_0^2 \beta + 316y^i y_j s_m s_0^m \beta^2 + 220y^i y_j r_{0m} s_0^m \beta - 4y^i y_j s_{0|0} \beta \\
& +12b^i y_j r_{00|0} \beta - 7008s_{0|0}^i y_j \beta^2 b^4 - 5120s_{0|0}^i y_j \beta^2 b^6 - 1024s_{0|0}^i y_j \beta^2 b^8 + 4y^i y_j r_{00} s_0 + 1728b^i s_{j|0} b^2 \beta^4 \\
& +5184s_{0|0}^i b_j b^2 \beta^3 + 3456s_{0|0}^i b_j \beta^3 b^4 - 592g^i y_j r_{00} \beta^2 + 840\delta_j^i r_{00} r_0 \beta^2 - 1260\delta_j^i r_{00|0} b^2 \beta^2 \\
& -1584\delta_j^i r_{00|0} b^4 \beta^2 + 24b^i y_j r_{00}^2 b^2 - 1024y^i r_{jk} s_0^k b^6 \beta^3 - 2144b^i r_j r_{00} \beta^3 - 708b^i r_{j0} r_{00} \beta^2 \\
& +2144b^i r_{j0} r_0 \beta^3 - 2736b^i b_j s_{0|0} \beta^3 + 600b^i b_j r_{00}^2 \beta + 9984y^i s_{0|j} b^2 \beta^3 + 7296y^i s_{0|j} \beta^3 b^4 - 512r_j^i r_{00} \beta^3 b^6 \\
& -6432r_j^i r_{00} \beta^3 b^2 + 24y^i y_j r_{00|0} b^4 + 12y^i y_j r_{00|0} b^2 + 576b^i s_j r_0 \beta^4 - 9984\delta_j^i r_{0m} s_0^m \beta^3
\end{aligned}$$

$$\begin{aligned}
& -7296\delta_j^i r_{0m} s_0^m b^4 \beta^3 - 4992\delta_j^i s_{0|0} b^2 \beta^3 - 3648\delta_j^i s_{0|0} b^4 \beta^3 - 576y^i r_{j0} s_0 \beta^2 - 840y^i r_{j0} r_0 \beta^2 \\
& + 12y^i r_{j0} r_{00} \beta - 1152b^i r_{j0} s_0 \beta^4 + 3328y^i r_{j0} s_0 \beta^3 + 840y^i r_{j0} r_{00} \beta^2 + 936y^i b_j s_m s_0^m \beta^3 + 6432b^i r_{j0|0} b^2 \beta^3 \\
& + 4224b^i r_{j0|0} \beta^3 b^4 + 512b^i r_{j0|0} b^6 \beta^3 - 6432b^i r_{00|j} b^2 \beta^3 - 4224b^i r_{00|j} \beta^3 b^4 - 512b^i r_{00|j} b^6 \beta^3 \\
& - 576g^i y_j s_0 \beta^3 + 2520y^i r_{00|j} b^2 \beta^2 + 3168y^i r_{00|j} \beta^2 b^4 + 1152y^i r_{00|j} \beta^2 b^6 - 2520y^i r_{j0|0} b^2 \beta^2 \\
& - 3168y^i r_{j0|0} \beta^2 b^4 - 1152y^i r_{j0|0} \beta^2 b^6 + 4992y^i r_{k0} s_j^k b^2 \beta^3 + 3648y^i r_{k0} s_j^k \beta^3 b^4 + 512y^i r_{k0} s_j^k b^6 \beta^3 \\
& - 9984y^i r_{jk} s_0^k b^2 \beta^3 - 7296y^i r_{jk} s_0^k \beta^3 b^4 + 16y^i y_j r_{00|0} b^6 + 1728y^i s_m s_0^m b^2 \beta^4 + 48y^i b_j r_{00}^2 b^4 \\
& + 96y^i b_j r_{00}^2 b^2 - 512\delta_j^i s_0^2 b^4 \beta^3 + 2048\delta_j^i s_0^2 b^5 \beta^3 - 512\delta_j^i s_{0|0} b^6 \beta^3 - 1024\delta_j^i r_{0m} s_0^m b^6 \beta^3 - 576\delta_j^i r_{00|0} b^6 \beta^2 \\
& - 3456\delta_j^i s_m s_0^m b^2 \beta^4 - 360\delta_j^i r_{00}^2 b^4 \beta - 312\delta_j^i r_{00}^2 b^2 \beta - 228\delta_j^i r_{00} s_0 \beta^2 - 704\delta_j^i s_0^2 b^2 \beta^3 + 6656\delta_j^i s_0^2 b^3 \beta^3 \\
& + 9728\delta_j^i s_0^2 b^3 \beta^3 + 3328\delta_j^i r_{00} s_0 \beta^3 - 24y^i b_j r_{00|0} \beta - 3456b^i s_{0|j} b^2 \beta^4 + 3456b^i r_{jk} s_0^k b^2 \beta^4 - 1664y^i s_j r_0 \beta^3 \\
& - 4224r_j^i r_{00} \beta^3 b^4 - 3456r_j^i s_0 b^2 \beta^4 - 1336b^i y_j s_0^2 \beta^2 + 2088b^i y_j s_m s_0^m \beta^3 - 232b^i y_j r_{0m} s_0^m \beta^2 \\
& + 952b^i y_j s_{0|0} \beta^2 - 1392y^i b_j s_0^2 \beta^2 + 1728g^i r_{j0} b^2 \beta^4 + 576g^i b_j r_{00} \beta^3 - 1728b^i r_{k0} s_j^k b^2 \beta^4 - 4992y^i s_{j|0} b^2 \beta^3 \\
& - 1328y^i y_j r_{00} s_0 b^2 \beta + 128y^i y_j r_{00} s_0 b \beta + 128y^i y_j r_{00} s_0 b^3 \beta - 256y^i y_j r_{00} s_0 b^5 \beta - 1088y^i y_j r_{00} s_0 b^4 \beta \\
& - 24b^i y_j r_{00} s_0 b^2 \beta - 192b^i y_j r_{00} s_0 b \beta - 384b^i y_j r_{00} s_0 b^3 \beta - 48b^i y_j r_{00} r_0 b^2 \beta + 768y^i b_j r_{00} r_0 b^4 \beta \\
& + 1536y^i b_j r_{00} s_0 b^4 \beta^2 - 480y^i b_j r_{00} s_0 b \beta + 384y^i b_j r_{00} s_0 b^3 \beta + 912y^i b_j r_{00} r_0 b^2 \beta - 480y^i b_j r_{00} r_0 b \beta \\
& + 384y^i b_j r_{00} r_0 b^3 \beta + 1704y^i b_j r_{00} s_0 b^2 \beta + 6912b^i b_j r_{00} s_0 b \beta^3 + 4800y^i b_j r_{00} s_0 b^2 \beta^2 - 7104y^i b_j r_{00} s_0 b \beta^2 \\
& - 6144y^i b_j r_{00} s_0 b^3 \beta^2 + 1536y^i b_j r_{00} s_0 b^5 \beta + 96y^i b_j r_{00} s_0 b^4 \beta + 1536y^i b_j r_{00} r_0 b^5 \beta + 4608b^i b_j r_{00} r_0 b^3 \beta^2 \\
& + 576b^i b_j r_{00} r_0 b^2 \beta^2 + 5760b^i b_j r_{00} r_0 b \beta^2 + 5760b^i b_j r_{00} s_0 b \beta^2 + 4608b^i b_j r_{00} s_0 b^3 \beta^2 - 2048b^i y_j r_{00} s_0 b^5 \beta^2 \\
& + 512b^i y_j r_{00} s_0 b^4 \beta^2 + 1728b^i b_j r_{00} s_0 b^2 \beta^2 - 9728b^i y_j r_{00} s_0 b^3 \beta^2 - 288b^i y_j r_{00} s_0 b^4 \beta - 192b^i y_j r_{00} r_0 b \beta \\
& + - 384b^i y_j r_{00} r_0 b^3 \beta + 1280b^i y_j r_{00} s_0 b^2 \beta^2 - 6080b^i y_j r_{00} s_0 b \beta^2 - 3456s_k^i s_0^k y_j \beta^3 b^4 - 1944s_0^i b_j s_0 \beta^3 \\
& - 4320s_k^i s_0^k y_j b^2 \beta^3 + 2592\beta^2 s_0^i y_j s_0 b^4 + 432\beta s_0^i y_j r_{00} b^4 + 288\beta s_0^i y_j r_{00} b^6 - 3032b^i s_j r_{00} \beta^3 \\
& - 864b^i s_j s_0 \beta^4 - 4536s_0^i b_j r_{00} b^2 \beta^2 - 2592s_0^i b_j r_{00} \beta^2 b^4 + 48r_0^i y_j r_{00} b^2 \beta + 3216r_0^i y_j s_0 b^2 \beta^2 \\
& + 48r_0^i y_j r_{00} b^4 + 2880r_0^i y_j s_0 b^2 b^4 + 512r_0^i y_j s_0 b^6 \beta^2 - 1440r_0^i b_j r_{00} b^2 \beta^2 - 576r_0^i b_j r_{00} \beta^2 b^4 \\
& - 2880r_0^i b_j s_0 b^2 \beta^3 + 2592\beta^2 s_0^i y_j s_0 b^2 + 216\beta s_0^i y_j r_{00} b^2 + 216y^i s_j r_{00} b^2 \beta - 2880y^i s_j s_0 b^2 \beta^2 \\
& + 864y^i s_j r_{00} b^4 + 1152b^i s_j r_{00} b^2 b^4 + 1728b^i s_j s_0 b^2 \beta^3 + 3312b^i s_j r_{00} b^2 \beta^2 - 576b^i b_j r_{0m} s_0^m b^2 \beta^3 \\
& - 2208g^i y_j r_{00} b^2 \beta^2 - 512g^i y_j r_{00} b^6 \beta^2 + 512b^i r_{j0} s_0 \beta^3 b^4 - 2048b^i r_{j0} s_0 b^5 \beta^3 - 2496\delta_j^i r_{00} s_0 b^4 \beta^2 \\
& + 2304\delta_j^i r_{00} r_0 b^5 \beta^2 + 576y^i s_j r_{00} b \beta + 576y^i b_j s_m s_0^m b^2 \beta^3 - 576b^i b_j r_{00|0} b^4 \beta^2 + 4864\delta_j^i r_{00} s_0 b^2 \beta^3 \\
& + 6656\delta_j^i r_{00} s_0 b \beta^3 + 9728\delta_j^i r_{00} s_0 b^3 \beta^3 + 2304\delta_j^i r_{00} s_0 b^5 \beta^2 + 2048\delta_j^i r_{00} s_0 b^5 \beta^3 + 48y^i y_j s_{0|0} b^4 \beta \\
& + 512b^i y_j s_{0|0} \beta^2 b^6 - 13312y^i r_{j0} s_0 b \beta^3 - 256b^i y_j s_0^2 b^2 \beta^2 - 6080b^i y_j s_0^2 b \beta^2 - 9728b^i y_j s_0^2 b^3 \beta^2 \\
& - 1200b^i y_j r_{0m} s_0^m b^2 \beta^2 - 1728b^i y_j r_{0m} s_0^m b^4 \beta^2 + 3216b^i y_j s_{0|0} b^2 \beta^2 + 2880b^i y_j s_{0|0} b^4 \beta^2 + 120b^i b_j r_{00}^2 b^2 \beta \\
& + 6480b^i b_j r_{00} s_0 \beta^2 + 512b^i r_{j0} r_0 b^4 \beta^3 - 2048b^i r_{j0} r_0 b^5 \beta^3 + 8576b^i s_j r_{00} b \beta^3 + 11264b^i s_j r_{00} b^3 \beta^3 \\
& + 2048b^i s_j r_{00} b^5 \beta^3 + 4864y^i r_{j0} s_0 b^2 \beta^3 + 960y^i b_j s_0^2 b^2 \beta^2 - 7104y^i b_j s_0^2 b \beta^2 + 720b^i b_j r_{00} r_0 \beta^2 \\
& - 1440b^i b_j r_{00|0} b^2 \beta^2 - 2304g^i y_j r_{00} b^2 b^4 + 2048y^i s_j r_0 b^5 \beta^3 + 64y^i y_j s_{0|0} b \beta^6 + 1088y^i y_j r_{0m} s_0^m b^6 \beta \\
& + 1104y^i b_j s_{0|0} b^2 \beta^2 + 384y^i b_j s_{0|0} b^4 \beta^2 - 2048y^i s_j s_0 b^5 \beta^3 - 512y^i s_j r_0 b^4 \beta^3 + 228y^i b_j r_{00} r_0 \beta \\
& - 264y^i b_j r_{00|0} b^2 \beta - 11264b^i r_{j0} r_0 b^3 \beta^3 - 24b^i y_j r_{00} r_0 \beta + 1152y^i y_j r_{0m} s_0^m b^2 \beta + 1968y^i y_j r_{0m} s_0^m b^4 \beta \\
& + 184y^i y_j r_{00} s_0 b^4 - 64y^i y_j r_{00} s_0 b^5 - 32y^i y_j r_{00} r_0 b^4 - 64y^i y_j r_{00} r_0 b^5 + 1464y^i y_j s_m s_0^m b^2 \beta^2 \\
& + 1920y^i y_j s_m s_0^m b^4 \beta^2 - 256y^i y_j s_0^2 b^5 \beta - 32y^i y_j s_0^2 b^4 \beta - 624y^i b_j r_{00|0} b^4 \beta - 8576b^i r_{j0} s_0 b \beta^3 \\
& - 768b^i r_{j0} r_0 b^2 \beta^2 - 1728y^i r_{j0} s_0 \beta^2 b^4 + 4608y^i r_{j0} s_0 b^5 \beta^2 - 1152y^i r_{j0} r_0 b^4 \beta^2 + 4608y^i r_{j0} r_0 b^5 \beta^2 \\
& + 2112\delta_j^i r_{00} r_0 b^2 \beta^2 + 1680\delta_j^i r_{00} r_0 b \beta^2 - 488y^i y_j s_0^2 b \beta + 128y^i y_j s_0^2 b \beta + 128y^i y_j s_0^2 b^3 \beta - 392y^i y_j r_{00} s_0 \beta \\
& - 4608y^i s_j r_{00} b^5 \beta^2 - 8576b^i r_{j0} r_0 b \beta^3 + 1856b^i r_{j0} s_0 b^2 \beta^3 - 11264b^i r_{j0} s_0 b^3 \beta^3 + 2816b^i r_{j0} r_0 b^2 \beta^3 \\
& + 4224\delta_j^i r_{00} r_0 b^3 \beta^2 + 512y^i y_j s_m s_0^m b^6 \beta^2 + 8448y^i r_{j0} s_0 b^3 \beta^2 + 8448y^i r_{j0} r_0 b^3 \beta^2 - 19456y^i r_{j0} s_0 b^3 \beta^3 \\
& + 1024y^i r_{j0} s_0 \beta^3 b^4 - 4096y^i r_{j0} s_0 b^5 \beta^3 - 2784\delta_j^i r_{00} s_0 b^2 \beta^2 + 1680\delta_j^i r_{00} s_0 b \beta^2 + 4224\delta_j^i r_{00} s_0 b^3 \beta^2
\end{aligned}$$

$$\begin{aligned}
& -3360y^i s_j r_{00} b \beta^2 - 2880b^i b_j s_{0|0} b^2 \beta^3 - 1536y^i b_j r_{0m} s_0^m b^6 \beta^2 - 384y^i b_j r_{00|0} b^6 \beta - 5424y^i b_j r_{0m} s_0^m b^2 \beta^2 \\
& -6720y^i b_j r_{0m} s_0^m b^4 \beta^2 - 16y^i y_j r_{00} s_0 b + 100y^i y_j r_{00} s_0 b^2 - 64y^i y_j r_{00} s_0 b^3 - 16y^i y_j r_{00} r_0 b \\
& -32y^i y_j r_{00} r_0 b^2 - 64y^i y_j r_{00} r_0 b^3 - 6656y^i s_j s_0 b \beta^3 + 6656y^i s_j r_0 b \beta^3 - 9728y^i s_j s_0 b^3 \beta^3 - 12864\bar{R}_j^i \beta^3 b^4 \\
& -2432y^i s_j r_0 b^2 \beta^3 + 9728y^i s_j r_0 b^3 \beta^3 - 144y^i b_j r_{00} s_0 \beta - 6144y^i b_j s_0^2 b^3 \beta^2 + 2160y^i b_j r_{00} s_0 \beta^2 \\
& +48b^i y_j r_{00|0} b^2 \beta + 48b^i y_j r_{00|0} b^4 \beta - 4608y^i r_j r_{00} b^5 \beta^2 + 512b^i y_j r_{00} s_0 \beta^2 + 2880b^i y_j s_m s_0^m b^2 \beta^3 \\
& +1152g^i b_j r_{00} \beta^3 b^2 + 8576b^i r_j r_{00} b \beta^3 - 1152g^i y_j s_0 b^2 \beta^3 - 8448y^i s_j r_{00} b^3 \beta^2 + 6912b^i b_j s_0^2 b \beta^3 \\
& +2304b^i s_j s_0 b \beta^4 - 2304b^i s_j r_0 b \beta^4 - 2112y^i r_j r_{00} \beta^2 b^2 + 1152\delta_j^i r_{00} r_0 b^4 \beta^2 + 1024\delta_j^i r_{00} s_0 b^4 \beta^3 \\
& +3360y^i r_j s_0 b \beta^2 + 3360y^i r_j r_0 b \beta^2 - 108y^i r_j r_{00} b^2 \beta - 2448y^i r_j s_0 b^2 \beta^2 - 192y^i r_j r_{00} b \beta^4 \\
& -2048b^i y_j s_0^2 b^5 \beta^2 + 512b^i y_j s_0^2 b^4 \beta^2 + 2048b^i r_j r_{00} b^5 \beta^3 + 4608b^i r_j s_0 b \beta^4 + 2112y^i r_j r_{00} b^2 \beta^2 \\
& -3360y^i r_j r_{00} b \beta^2 - 8448y^i r_j r_{00} b^3 \beta^2 + 1152y^i r_j r_{00} \beta^2 b^4 - 48b^i y_j r_{00} s_0 \beta - 512b^i y_j r_{0m} s_0^m b^6 \beta^2 \\
& -2816b^i r_j r_{00} \beta^3 b^2 - 512b^i r_j r_{00} \beta^3 b^4 + 11264b^i r_j r_{00} b^3 \beta^3 + 1728r_0^i s_j b^2 \beta^4 + 952r_0^i y_j s_0 \beta^2 \\
& +12r_0^i y_j r_{00} \beta - 2736r_0^i b_j s_0 \beta^3 - 684r_0^i b_j r_{00} \beta^2 + 36\beta s_0^i y_j r_{00} + 648\beta^2 s_0^i y_j s_0 + 6432r_0^i r_j b^2 \beta^3 \\
& +4224r_0^i r_j b^3 \beta^4 + 512r_0^i r_j b^6 \beta^3 - 1152y^i s_j s_0 \beta^2 b^4 - 1296s_k^i s_0^k y_j \beta^3 + 1728r_0^i s_j \beta^4 + 648s_k^i s_0^k b_j \beta^4 \\
& -3230560s_0^i s_0^j b^2 \beta^3 - 4257984s_0^i s_0^j \beta^3 b^4 - 2336\bar{R}_j^i \beta^3 - 9760\bar{R}_j^i \beta^3 b^2 - 5632\bar{R}_j^i \beta^3 b^6 - 512\bar{R}_j^i \beta^3 b^8 \\
t_9 := & -432s^i s_j \beta^4 - 1188s_k^i s_j^k \beta^4 + 182712s_0^i s_0^j \beta^2 + 3\delta_j^i r_0^2 + 1488s_{j|0}^i \beta^3 - 2976s_{i|j}^i \beta^3 + 396s_0^i b_j r_{00} \beta \\
& +254208s_0^i s_0^j \beta^2 b^8 - 744r_0^i r_j \beta^2 + 744r_j^i r_{00} \beta^2 + 2088\delta_j^i s_m s_0^m \beta^3 + 5472s_{j|0}^i b^2 \beta^3 - 476y^i r_{k0} s_j^k \beta^2 \\
& +744b^i r_{00|j} \beta^2 - 624s_{0|0}^i b_j \beta^2 + 432b^i s_m s_0^m \beta^4 + 1368b^i r_{k0} s_j^k \beta^3 + 38\delta_j^i r_{00|0} \beta + 952y^i r_{jk} s_0^k \beta^2 \\
& +476y^i s_{j|0} \beta^2 + 80s_{0|0}^i y_j \beta + 36\delta_j^i r_{00}^2 b^4 + 24\delta_j^i r_{00}^2 b^2 - 952y^i s_{0|j} \beta^2 + 2736b^i s_{0|j} \beta^3 - 1044y^i s_m s_0^m \beta^3 \\
& -10944s_{i|j}^i b^2 \beta^3 - 12y^i y_j r_{0m} s_0^m + 12y^i y_j s_0^2 - 72b^i b_j r_{00}^2 + 2y^i b_j r_{00|0} - 1368b^i s_{j|0} \beta^3 + 2736r_j^i s_0 \beta^3 \\
& -76y^i r_{00|j} \beta + 76y^i r_{j0|0} \beta - 3072s_{0|j}^i b^6 \beta^3 - 744b^i r_{j0|0} \beta^2 - 452\delta_j^i s_0^2 \beta^2 + 5760s_{j|0}^i \beta^3 b^4 + 1536s_{j|0}^i b^6 \beta^3 \\
& -2736b^i r_{jk} s_0^k \beta^3 - 1368s^i r_{j0} \beta^3 - 11520s_{i|j}^i \beta^3 b^4 + 952\delta_j^i r_{0m} s_0^m \beta^2 + 476\delta_j^i s_{0|0} \beta^2 + 228y^i s_j s_0 \beta \\
& +144b^i b_j r_{00|0} \beta - 3120b^i b_j s_0^2 \beta^2 + 1296b^i b_j s_m s_0^m \beta^3 + 1056b^i b_j r_{0m} s_0^m \beta^2 + 1608b^i b_j s_{0|0} \beta^2 \\
& -144y^i s_j r_{00} b^6 + 200y^i b_j r_{0m} s_0^m \beta - 1280y^i s_{0|j} \beta^2 b^6 + 24b^i r_{j0} s_0 \beta^2 - 80y^i b_j s_{0|0} \beta - 2736b^i r_{j0|0} b^2 \beta^2 \\
& +24y^i y_j r_0 s_0 - 20y^i b_j r_{00} s_0 - 60y^i y_j s_m s_0^m \beta + 1408s_{0|0}^i y_j \beta b^6 + 512s_{0|0}^i y_j \beta b^8 + 24y^i r_{j0} r_{00} b^4 \\
& -2880b^i s_{j0} b^2 \beta^3 - 1152b^i s_{j0} \beta^3 b^4 + 5760b^i s_{0|j} b^2 \beta^3 + 1632b^i s_j s_0 \beta^3 + 1380b^i s_j r_{00} \beta^2 - 2880s_{0|0}^i b_j b^2 \beta^2 \\
& -4032s_{0|0}^i b_j \beta^2 b^4 - 1536s_{0|0}^i b_j \beta^2 b^6 - 36b^i b_j r_{00}^2 b^2 + 312s^i y_j s_0 \beta^2 + 108s^i y_j r_{00} \beta - 128\delta_j^i r_{00} r_0 \beta \\
& +192\delta_j^i r_{00|0} b^2 \beta + 312\delta_j^i r_{00|0} b^4 \beta + 352\delta_j^i s_0^2 b^2 \beta^2 + 12y^i r_{j0} r_{00} b^2 + 1848y^i s_{j0} b^2 \beta^2 + 2304r_j^i s_0 \beta^3 b^4 \\
& +1920b^i r_j s_0 \beta^3 - 20y^i b_j r_{00} r_0 - 912b^i r_{j0} r_0 \beta^2 + 144b^i r_{j0} r_{00} \beta - 3696y^i s_{0|j} b^2 \beta^2 - 4224y^i s_{0|j} \beta^2 b^4 \\
& -276s^i b_j r_{00} \beta^2 + 2736r_j^i r_{00} b^2 \beta^2 + 768r_j^i r_{00} b^6 \beta^2 + 2880r_j^i r_{00} \beta^2 b^4 - 24y^i y_j s_0^2 b^2 - 144y^i y_j r_{0m} s_0^m b^4 \\
& -72y^i y_j r_{0m} s_0^m b^2 - 36b^i y_j r_{00} s_0 - 960b^i s_j r_0 \beta^3 - 2448y^i s_m s_0^m b^2 \beta^3 - 1232\delta_j^i r_{00} s_0 \beta^2 + 4896\delta_j^i s_m s_0^m b^2 \beta^3 \\
& +3696\delta_j^i r_{0m} s_0^m b^2 \beta^2 + 4224\delta_j^i r_{0m} s_0^m b^4 \beta^2 + 1848\delta_j^i s_{0|0} b^2 \beta^2 + 2112\delta_j^i s_{0|0} b^4 \beta^2 + 104y^i r_{j0} s_0 \beta \\
& +128y^i r_{j0} r_0 \beta + 912b^i r_j r_{00} \beta^2 - 1232y^i r_j s_0 \beta^2 - 128y^i r_j r_{00} \beta + 72y^i b_j r_{00|0} b^4 + 24y^i b_j r_{00|0} b^2 \\
& -5760b^i r_{jk} s_0^k b^2 \beta^3 - 2880b^i r_{j0|0} \beta^2 b^4 - 768b^i r_{j0|0} \beta^2 b^6 + 2736b^i r_{00|j} b^2 \beta^2 + 2880b^i r_{00|j} \beta^2 b^4 \\
& +768b^i r_{00|j} \beta^2 b^6 - 832y^i s_j s_0 \beta^2 - 140y^i s_j r_{00} \beta - 384y^i r_{00|j} b^2 \beta - 624y^i r_{00|j} b b^4 - 320y^i r_{00|j} b b^6 \\
& +384y^i r_{j0|0} b^2 \beta + 624y^i r_{j0|0} b b^4 + 320y^i r_{j0|0} b b^6 - 1848y^i r_{k0} s_j^k b^2 \beta^2 - 2112y^i r_{k0} s_j^k b^2 b^4 \\
& -640y^i r_{k0} s_j^k b^2 b^6 + 3696y^i r_{jk} s_0^k b^2 \beta^2 + 4224y^i r_{jk} s_0^k b^4 \beta^2 + 1280y^i r_{jk} s_0^k b^2 b^6 - 96y^i y_j s_0^2 b^4 \\
& -96y^i y_j r_{0m} s_0^m b^6 - 1152y^i s_m s_0^m \beta^3 b^4 + 640\delta_j^i s_{0|0} \beta^2 b^6 + 1280\delta_j^i r_{0m} s_0^m b^6 \beta^2 + 160\delta_j^i r_{00|0} b^6 \beta \\
& -2560\delta_j^i s_0^2 b^5 \beta^2 + 640\delta_j^i s_0^2 b^4 \beta^2 + 2304\delta_j^i s_m s_0^m b^4 \beta^3 + 40\delta_j^i r_{00} s_0 \beta - 2464\delta_j^i s_0^2 b \beta^2 - 5632\delta_j^i s_0^2 b^3 \beta^2 \\
& +188y^i b_j s_0^2 \beta + 64y^i b_j r_{00|0} b^6 + 2304b^i s_{0|j} \beta^3 b^4 - 2304b^i r_{jk} s_0^k \beta^3 b^4 + 616y^i s_j r_0 \beta^2 - 2880s^i r_{j0} b^2 \beta^3 \\
& +5760r_j^i s_0 b^2 \beta^3 + 144b^i y_j s_0^2 \beta - 888b^i y_j s_m s_0^m \beta^2 + 72b^i y_j r_{0m} s_0^m \beta - 144b^i y_j s_{0|0} \beta - 336y^i b_j s_m s_0^m \beta^2
\end{aligned}$$

$$\begin{aligned}
& -1152s^i r_{j0} \beta^3 b^4 + 2880b^i r_{k0} s_j^k b^2 \beta^3 + 1152b^i r_{k0} s_j^k \beta^3 b^4 + 2112y^i s_{j|0} \beta^2 b^4 + 640y^i s_{j|0} \beta^2 b^6 \\
& + 544s_{0|0}^i y_j b^2 \beta + 1344s_{0|0}^i y_j \beta b^4 + 552\bar{R}_j^i \beta^2 + 2976\bar{R}_j^i \beta^2 b^2 + 5472\bar{R}_j^i \beta^2 b^4 + 3840\bar{R}_j^i \beta^2 b^6 \\
& + 768\bar{R}_j^i \beta^2 b^8 + 3552b^i b_j s_{0|0} b^2 \beta^2 + 1536b^i b_j s_{0|0} b^4 \beta^2 + 128y^i b_j s_{0|0} \beta b^6 + 3072b^i y_j r_{00} s_0 b^3 \beta \\
& - 512y^i b_j r_{00} s_0 b^5 \beta - 1408y^i b_j r_{00} s_0 b^4 \beta - 576b^i b_j r_{00} s_0 b^4 \beta + 384b^i b_j r_{00} s_0 b^2 \beta^2 - 8832b^i b_j r_{00} s_0 b \beta^2 \\
& - 6144b^i b_j r_{00} s_0 b^3 \beta^2 - 1984y^i b_j r_{00} s_0 b^2 \beta + 1600y^i b_j r_{00} s_0 b \beta + 1792y^i b_j r_{00} s_0 b^3 \beta - 2304b^i b_j r_{00} r_0 b^3 \beta \\
& - 288b^i b_j r_{00} r_0 b^2 \beta - 1728b^i b_j r_{00} r_0 b \beta - 1728b^i b_j r_{00} s_0 b \beta - 2304b^i b_j r_{00} s_0 b^3 \beta - 384b^i y_j r_{00} s_0 b^4 \beta \\
& - 2160b^i b_j r_{00} s_0 b^2 \beta + 1536b^i y_j r_{00} s_0 b^5 \beta - 480b^i y_j r_{00} s_0 b^2 \beta + 1152b^i y_j r_{00} s_0 b \beta + 1536s_k^i s_0^k y_j \beta^2 b^6 \\
& + 1944s_0^i b_j s_0 \beta^2 + 2016s_k^i s_0^k y_j b^2 \beta^2 + 3168s_k^i s_0^k y_j \beta^2 b^4 - 864\beta s_0^i y_j s_0 b^4 - 576\beta s_0^i y_j s_0 b^6 \\
& - 432\beta s_0^i y_j s_0 b^2 \beta + 1728s_0^i b_j r_{00} b^2 \beta + 3888s_0^i b_j s_0 b^2 \beta^2 + 2160s_0^i b_j r_{00} \beta b^4 + 576s_0^i b_j r_{00} \beta b^6 \\
& - 672r_0^i y_j s_0 b^2 \beta - 960r_0^i y_j s_0 \beta b^4 - 384r_0^i y_j s_0 b^6 \beta + 432r_0^i b_j r_{00} b^2 \beta + 3552r_0^i b_j s_0 b^2 \beta^2 + 288r_0^i b_j r_{00} \beta b^4 \\
& + 1536r_0^i b_j s_0 \beta^2 b^4 + 1408y^i b_j r_{00} s_0^m b^6 \beta + 2784y^i b_j r_{00} s_0^m b^4 \beta - 144y^i b_j s_{0|0} b^2 \beta + 96y^i y_j r_{00} s_0 b^2 \\
& - 332y^i s_j r_{00} b^2 \beta - 1312y^i s_j s_0 b^2 \beta^2 - 176y^i s_j r_{00} \beta b^4 + 1408y^i s_j r_{00} \beta^2 b^2 + 5632y^i s_j s_0 b^3 \beta^2 \\
& - 5632y^i s_j r_{00} b^3 \beta^2 + 1792y^i b_j s_0^2 b^3 \beta - 568y^i b_j r_{00} s_0 \beta - 144b^i y_j r_{00} s_0 \beta - 2544b^i y_j s_m s_0^m b^2 \beta^2 \\
& - 1536b^i y_j s_m s_0^m b^4 \beta^2 + 768b^i s_j r_{00} \beta^2 b^4 + 960b^i s_j s_0 b^2 \beta^3 - 1248s^i b_j r_{00} b^2 \beta^2 - 960s^i b_j r_{00} \beta^2 b^4 \\
& + 1920b^i r_j r_{00} b^2 \beta^2 - 3648b^i r_j r_{00} b \beta^2 - 7680b^i r_j r_{00} b^3 \beta^2 + 960s^i y_j s_0 \beta^2 b^4 + 2352b^i s_j r_{00} b^2 \beta^2 \\
& - 6144b^i b_j s_0^2 b^3 \beta^2 - 96b^i b_j r_{00} s_0 \beta^2 - 3072b^i s_j s_0 b^3 \beta^3 - 768b^i s_j r_{00} b^2 \beta^3 + 3072b^i s_j r_{00} b^3 \beta^3 - 3840b^i s_j s_0 b \beta^3 \\
& + 3840b^i s_j r_0 b \beta^3 - 320\delta_j^i r_{00} r_0 b^4 \beta - 2560\delta_j^i r_{00} s_0 b^5 \beta^2 - 1280\delta_j^i r_{00} s_0 b^4 \beta^2 + 584y^i r_{j0} s_0 b^2 \beta - 512y^i r_{j0} s_0 b \beta \\
& - 1664y^i r_{j0} s_0 b^3 \beta + 416y^i r_{j0} r_0 b^2 \beta - 512y^i r_{j0} r_0 b \beta - 1664y^i r_{j0} r_0 b^3 \beta + 608y^i r_{j0} s_0 b^4 \beta + 192b^i y_j s_0^2 b^4 \beta \\
& - 7680b^i r_j s_0 b \beta^3 + 1536b^i r_j s_0 b^2 \beta^3 - 6144b^i r_j s_0 b^3 \beta^3 + 512y^i r_j r_{00} b \beta + 1664y^i r_j r_{00} b^3 \beta + 4928y^i r_j s_0 b \beta^2 \\
& - 416y^i r_j r_{00} b^2 \beta - 2816y^i r_j s_0 b^2 \beta^2 - 320y^i r_j r_{00} \beta b^4 + 1280y^i r_j r_{00} b^5 \beta - 384b^i y_j s_{0|0} \beta b^6 \\
& + 384b^i y_j r_{00} s_0^m b^6 \beta + 1536b^i y_j s_0^2 b^5 \beta + 768b^i r_j r_{00} \beta^2 b^4 - 2880r_0^i s_j b^2 \beta^3 - 1152r_0^i s_j \beta^3 b^4 \\
& - 144r_0^i y_j s_0 \beta + 1608r_0^i b_j s_0 \beta^2 + 144r_0^i b_j r_{00} \beta - 72\beta s_0^i y_j s_0 - 1728s_k^i s_0^k b_j b^2 \beta^3 - 2736r_0^i r_{j0} b^2 \beta^2 \\
& - 2880r_0^i r_{j0} b^2 b^4 - 768r_0^i r_{j0} b^2 b^6 + 432y^i s_j s_0 b^2 \beta - 144y^i s_j s_0 \beta b^4 - 576b^i s_j s_0 \beta^2 b^4 - 1152b^i s_j r_{00} b^2 \beta \\
& - 4464b^i s_j s_0 b^2 \beta^2 - 720b^i s_j r_{00} \beta b^4 + 1056b^i b_j r_{00} s_0^m b^2 \beta^2 - 448y^i s_j s_0 \beta^2 b^4 - 192y^i s_j s_0 b^6 \beta \\
& + 528s^i y_j r_{00} b^2 \beta - 768b^i r_{j0} s_0 \beta^2 b^4 + 3072b^i r_{j0} s_0 b^5 \beta^2 - 768b^i r_{j0} r_0 b^4 \beta^2 - 224y^i b_j r_{00} s_0 b^4 \\
& - 256y^i b_j r_{00} s_0 b^5 - 128y^i b_j r_{00} r_0 b^4 - 256y^i b_j r_{00} r_0 b^5 + 32y^i b_j r_{00} s_0 b^3 68y^i b_j r_{00} s_0 b^2 - 64y^i b_j r_{00} s_0 b^3 \\
& + 32y^i b_j r_{00} r_0 b - 104y^i b_j r_{00} r_0 b^2 - 64y^i b_j r_{00} r_0 b^3 - 640\delta_j^i r_{00} r_0 b^5 \beta + 1280y^i s_j r_{00} b^5 \beta - 48y^i b_j s_m s_0^m b^2 \beta^2 \\
& + 384y^i b_j s_m s_0^m b^4 \beta^2 + 1440y^i b_j r_{00} s_0^m b^2 \beta + 960b^i b_j s_0^2 b^2 \beta^2 - 8832b^i b_j s_0^2 b \beta^2 - 2816\delta_j^i r_{00} s_0 b^2 \beta^2 \\
& - 2464\delta_j^i r_{00} s_0 b \beta^2 - 5632\delta_j^i r_{00} s_0 b^3 \beta^2 - 640\delta_j^i r_{00} s_0 b^5 \beta + 832\delta_j^i r_{00} s_0 b^4 \beta + 11264y^i r_{j0} s_0 b^3 \beta^2 + 96b^i y_j s_0^2 b^2 \beta \\
& + 1152b^i y_j s_0^2 b \beta + 3072b^i y_j s_0^2 b^3 \beta + 384b^i y_j r_{00} s_0^m b^2 \beta + 672b^i y_j r_{00} s_0^m b^4 \beta - 672b^i y_j s_{0|0} b^2 \beta \\
& - 960b^i y_j s_{0|0} b^4 \beta - 2808b^i b_j r_{00} s_0 \beta + 3072b^i r_{j0} r_0 b^5 \beta^2 - 3648b^i s_j r_{00} b \beta^2 - 7680b^i s_j r_{00} b^3 \beta^2 \\
& - 3072b^i s_j r_{00} b^5 \beta^2 - 1312y^i b_j s_0^2 b^2 \beta + 1600y^i b_j s_0^2 b \beta - 216b^i b_j r_{00} r_0 \beta + 432b^i b_j r_{00} b^2 \beta + 288b^i b_j r_{00} b^4 \beta \\
& + 1104s^i y_j s_0 b^2 \beta^2 + 816s^i y_j r_{00} \beta b^4 + 384s^i y_j r_{00} \beta b^6 + 96y^i b_j s_{0|0} b^4 \beta + 2560y^i s_j s_0 b^5 \beta^2 + 640y^i s_j r_0 b^4 \beta^2 \\
& - 2560y^i s_j r_0 b^5 \beta^2 + 96y^i y_j r_{00} s_0 b^4 - 336y^i y_j s_m s_0^m b^2 \beta - 624y^i y_j s_m s_0^m b^4 \beta - 512y^i b_j s_0^2 b^5 \beta - 64y^i b_j s_0^2 b^4 \beta \\
& - 1920b^i r_{j0} r_0 \beta^2 b^2 + 7680b^i r_{j0} s_0 b^3 \beta^2 + 3648b^i r_{j0} s_0 b \beta^2 + 3648b^i r_{j0} r_0 b \beta^2 + 216b^i r_{j0} r_{00} b^2 \beta \\
& - 1056b^i r_{j0} s_0 b^2 \beta^2 - 416\delta_j^i r_{00} r_0 b^2 \beta - 256\delta_j^i r_{00} r_0 b \beta + 7680b^i r_{j0} r_0 b^3 \beta^2 - 3072b^i r_{j0} r_0 b^5 \beta^2 \\
& - 832\delta_j^i r_{00} r_0 b^3 \beta - 384y^i y_j s_m s_0^m b^6 \beta - 1280y^i r_{j0} s_0 b^5 \beta + 320y^i r_{j0} r_0 b^4 \beta - 1280y^i r_{j0} r_0 b^5 \beta - 72b^i y_j r_{00} s_0 b^2 \\
& - 1280y^i r_{j0} s_0 b^2 b^4 + 5120y^i r_{j0} s_0 b^5 \beta^2 + 640\delta_j^i r_{00} s_0 b^2 \beta - 256\delta_j^i r_{00} s_0 b \beta - 832\delta_j^i r_{00} s_0 b^3 \beta + 512y^i s_j r_{00} b \beta \\
& + 1664y^i s_j r_{00} b^3 \beta + 2464y^i s_j s_0 b \beta^2 - 2464y^i s_j r_0 b \beta^2 - 384b^i b_j r_{00} s_0^m b^4 \beta^2 + 408s_k^i s_0^k y_j \beta^2 \\
& - 1368r_0^i s_j \beta^3 - 864s_k^i s_0^k b_j \beta^3 - 1728s_k^i s_j^k b^2 \beta^4 + 985056s_0^i s_{0j} b^2 \beta^2 + 1811232s_0^i s_{0j} \beta^2 b^4 \\
& + 1271040s_0^i s_{0j} \beta^2 b^6 - 144y^i s_j r_{00} b^4 - 36y^i s_j r_{00} b^2 - 2736b^i s_j s_0 \beta^2 - 396b^i s_j r_{00} \beta
\end{aligned}$$

$$\begin{aligned}
t_{10} := & 648s^i s_j \beta^3 + 864s_k^i s_j^k \beta^3 - 23832s_0^i s_0 j \beta - 2\delta_j^i r_{00|0} - 424s_{j|0}^i \beta^2 + 848s_{j|0}^i \beta^2 + 4y^i r_{00|j} - 4s_{0|0}^i y_j \\
& - 4y^i r_{j0|0} - 36s_0^i b_j r_{00} + 120r_0^i r_{j0} \beta - 12y^i s_j s_0 + 36b^i s_j r_{00} - 712\delta_j^i s_m s_0^m \beta^2 + 68y^i r_{k0} s_j^k \beta \\
& - 120b^i r_{00|j} \beta + 112s_{0|0}^i b_j \beta - 648b^i s_m s_0^m \beta^3 - 536b^i r_{k0} s_j^k \beta^2 - 136y^i r_{jk} s_0^k \beta - 68y^i s_{j|0} \beta \\
& - 24\delta_j^i r_{00|0} b^4 - 12\delta_j^i r_{00|0} b^2 + 136y^i s_{0|j} \beta + 356y^i s_m s_0^m \beta^2 - 2144s_{j|0}^i b^2 \beta^2 - 64s_{0|0}^i y_j b^8 \\
& - 128s_{0|0}^i y_j b^6 - 4\delta_j^i r_{00} s_0 + 8\delta_j^i r_{00} r_0 - 16\delta_j^i r_{00|0} b^6 - 96s_{0|0}^i y_j b^4 - 32s_{0|0}^i y_j b^2 - 8s^i y_j r_{00} + 8y^i r_j r_{00} \\
& - 8y^i r_{j0} s_0 - 8y^i r_{j0} r_0 + 48y^i r_{00|j} b^4 + 24y^i r_{00|j} b^2 + 32y^i r_{00|j} b^6 - 48y^i r_{j0|0} b^4 - 24y^i r_{j0|0} b^2 \\
& - 32y^i r_{j0|0} b^6 + 7104s_{j|0}^i \beta^2 b^4 - 12b^i r_{j0} r_{00} + 8y^i s_j r_{00} + 4y^i y_j s_m s_0^m - 8b^i y_j r_{0m} s_0^m + 8b^i y_j s_{0|0} \\
& + 40b^i y_j s_0^2 - 12b^i b_j r_{00|0} - 16y^i b_j r_{0m} s_0^m + 4y^i b_j s_{0|0} + 20y^i b_j s_0^2 + 536b^i s_{j|0} \beta^2 - 1072r_j^i s_0 \beta^2 \\
& - 120r_j^i r_{00} \beta + 4096s_{j|0}^i \beta^2 b^6 + 512s_{j|0}^i \beta^2 b^8 + 120b^i r_{j0|0} \beta + 80\delta_j^i s_0^2 \beta - 1072b^i s_{0|j} \beta^2 \\
& - 3552s_{j|0}^i \beta^2 b^4 - 2048s_{j|0}^i \beta^2 b^6 - 256s_{j|0}^i \beta^2 b^8 + 4288s_{j|0}^i b^2 \beta^2 + 1072b^i r_{jk} s_0^k \beta^2 + 536s^i r_{j0} \beta^2 \\
& - 136\delta_j^i r_{0m} s_0^m \beta - 68\delta_j^i s_{0|0} \beta + 144y^i s_j s_0 b^4 + 864b^i s_j s_0 \beta + 144b^i s_j r_{00} b^2 + 144b^i s_j r_{00} b^4 - 576b^i r_{00|j} b^2 \beta \\
& - 864b^i r_{00|j} \beta b^4 - 384b^i r_{00|j} \beta b^6 + 136y^i s_j s_0 \beta - 80s^i y_j s_0 \beta + 336y^i r_{k0} s_j^k b^2 \beta + 528y^i r_{k0} s_j^k \beta b^4 \\
& + 256y^i r_{k0} s_j^k \beta b^6 - 672y^i r_{jk} s_0^k b^2 \beta - 1056y^i r_{jk} s_0^k \beta b^4 - 512y^i r_{jk} s_0^k \beta b^6 - 32y^i r_j r_{00} b + 32y^i r_j r_{00} b^2 \\
& - 128y^i r_j r_{00} b^3 + 32y^i r_j r_{00} b^4 - 128y^i r_j r_{00} b^5 + 32y^i y_j s_m s_0^m b^6 + 416y^i b_j s_0^2 b^2 + 1248y^i s_m s_0^m \beta^2 b^4 \\
& + 256y^i s_m s_0^m \beta^2 b^6 - 256\delta_j^i s_{0|0} \beta b^6 - 512\delta_j^i r_{0m} s_0^m \beta b^6 + 1024\delta_j^i s_0^2 b^5 \beta - 352\delta_j^i s_0^2 b^4 \beta - 512\delta_j^i s_m s_0^m b^6 \beta^2 \\
& + 448\delta_j^i s_0^2 b \beta + 1408\delta_j^i s_0^2 b^3 \beta + 320y^i b_j s_0^2 b^4 + 56y^i b_j r_{0s_0} - 512b^i s_{0|j} \beta^2 b^6 - 864b^i s_m s_0^m b^2 \beta^3 \\
& + 1536s^i r_{j0} \beta^2 b^4 + 512b^i r_{jk} s_0^k \beta^2 b^6 + 1776s^i r_{j0} b^2 \beta^2 - 1776b^i r_{k0} s_j^k b^2 \beta^2 - 32y^i s_j r_{00} b - 112y^i s_j r_{00} \beta \\
& - 128y^i b_j s_0^2 b^3 - 3072r_j^i s_0 \beta^2 b^4 + 152b^i y_j s_m s_0^m \beta + 40y^i b_j s_m s_0^m \beta + 256s^i r_{j0} \beta^2 b^6 - 72s^i b_j s_0 \beta^2 \\
& - 1536b^i r_{k0} s_j^k \beta^2 b^4 - 256y^i s_{j|0} \beta b^6 + 1024b^i b_j r_{0s_0} b^5 \beta - 256b^i b_j r_{0s_0} b^4 \beta + 3712b^i b_j r_{0s_0} b \beta \\
& + 5632b^i b_j r_{0s_0} b^3 \beta - 256b^i b_j r_{0s_0} b^2 \beta - 256s_k^i s_0^k y_j \beta b^8 - 648s_0^i b_j s_0 \beta - 416s_k^i s_0^k y_j b^2 \beta - 960s_k^i s_0^k y_j \beta b^4 \\
& - 896s_k^i s_0^k y_j \beta b^6 - 72\bar{R}_j \beta - 1152\bar{R}_j \beta b^4 - 1152\bar{R}_j \beta b^6 - 480\bar{R}_j \beta b^2 - 384\bar{R}_j \beta b^8 - 2592s_0^i b_j s_0 b^2 \beta \\
& - 2592s_0^i b_j s_0 \beta b^4 - 1440r_0^i b_j s_0 b^2 \beta - 1344r_0^i b_j s_0 \beta b^4 - 256r_0^i b_j s_0 b^6 \beta + 408b^i b_j r_{00} s_0 + 24b^i b_j r_{00} r_0 \\
& - 48b^i b_j r_{00|0} b^4 - 48b^i b_j r_{00|0} b^2 - 64y^i b_j s_{0|0} b^6 - 160\delta_j^i s_0^2 b^2 \beta - 256b^i y_j s_0^2 b^5 + 64b^i y_j s_{0|0} b^6 + 16b^i y_j r_{0s_0} \\
& + 64b^i y_j s_0^2 b^4 - 64b^i y_j r_{0m} s_0^m b^6 - 64b^i y_j s_0^2 b + 112b^i y_j s_0^2 b^2 - 256b^i y_j s_0^2 b^3 - 96b^i y_j r_{0m} s_0^m b^4 \\
& - 48b^i y_j r_{0m} s_0^m b^2 + 48b^i y_j s_{0|0} b^2 + 96b^i y_j s_{0|0} b^4 + 32y^i r_{j0} s_0 b - 56y^i r_{j0} s_0 b^2 + 128y^i r_{j0} s_0 b^3 \\
& + 32y^i r_{j0} r_0 b - 32y^i r_{j0} r_0 b^2 + 128y^i r_{j0} r_0 b^3 - 192b^i r_j r_{00} \beta - 336y^i s_{j|0} b^2 \beta - 528y^i s_{j|0} \beta b^4 - 512r_j^i s_0 b^6 \beta^2 \\
& - 1184b^i r_j s_0 \beta^2 + 192b^i r_{j0} r_0 \beta - 96s^i y_j r_{00} b^4 - 64s^i y_j r_{00} b^6 + 1056y^i s_{0|j} \beta b^4 + 512y^i s_{0|j} \beta b^6 \\
& - 576r_j^i r_{00} b^2 \beta - 3552r_j^i s_0 b^2 \beta^2 - 864r_j^i r_{00} \beta b^4 - 384r_j^i r_{00} \beta b^6 + 24y^i y_j s_m s_0^m b^2 + 48y^i y_j s_m s_0^m b^4 \\
& + 592b^i s_j r_0 \beta^2 + 1272y^i s_m s_0^m b^2 \beta^2 + 224\delta_j^i r_0 s_0 \beta - 2544\delta_j^i s_m s_0^m b^2 \beta^2 - 2496\delta_j^i s_m s_0^m b^4 \beta^2 \\
& - 672\delta_j^i r_{0m} s_0^m b^2 \beta - 1056\delta_j^i r_{0m} s_0^m b^4 \beta - 336\delta_j^i s_{0|0} b^2 \beta - 528\delta_j^i s_{0|0} b^4 \beta + 224y^i r_j s_0 \beta + 56s^i b_j r_{00} \beta \\
& - 128y^i b_j s_0^2 b + 3072b^i r_{jk} s_0^k \beta^2 b^4 - 256b^i r_{k0} s_j^k \beta^2 b^6 + 3552b^i r_{jk} s_0^k b^2 \beta^2 + 384b^i r_{j0|0} \beta b^6 - 216s_0^i b_j r_{00} b^2 \\
& - 432s_0^i b_j r_{00} b^4 - 288s_0^i b_j r_{00} b^6 + 1536r_0^i s_j \beta^2 b^4 + 256r_0^i s_j \beta^2 b^6 - 416r_0^i b_j s_0 \beta + 1728s_k^i s_0^k b_j b^2 \beta^2 \\
& + 1728s_k^i s_0^k b_j \beta^2 b^4 + 48r_0^i y_j s_0 b^2 + 96r_0^i y_j s_0 b^4 + 64r_0^i y_j s_0 b^6 - 48r_0^i b_j r_{00} b^2 - 48r_0^i b_j r_{00} b^4 \\
& + 576r_0^i r_{j0} b^2 \beta + 864r_0^i r_{j0} \beta b^4 + 384r_0^i r_{j0} \beta b^6 + 1776r_0^i s_j b^2 \beta^2 + 2592b^i s_j s_0 b^2 \beta + 1728b^i s_j s_0 b^4 \\
& - 576b^i b_j r_{0m} s_0^m b^2 \beta + 192b^i b_j r_{0m} s_0^m b^4 \beta - 384s^i y_j s_0 b^2 \beta + 256y^i b_j r_{0s_0} b^5 + 320y^i b_j r_{0s_0} b^4 \\
& + 288b^i b_j r_{00} s_0 b^4 + 192b^i b_j r_{00} s_0 b + 528b^i b_j r_{00} s_0 b^2 + 384b^i b_j r_{00} s_0 b^3 - 192y^i b_j s_m s_0^m b^2 \beta - 128y^i b_j r_{0s_0} b \\
& - 672y^i b_j s_m s_0^m b^4 \beta + 1664b^i b_j s_0^2 b^2 \beta + 3712b^i b_j s_0^2 b \beta + 704\delta_j^i r_0 s_0 b^2 \beta + 448\delta_j^i r_0 s_0 b \beta + 1408\delta_j^i r_0 s_0 b^3 \beta \\
& - 2048y^i r_j s_0 b^5 \beta - 256b^i b_j s_{0|0} \beta b^6 + 256b^i b_j r_{0m} s_0^m b^6 \beta + 1024b^i b_j s_0^2 b^5 \beta - 256b^i b_j s_0^2 b^4 \beta + 768b^i s_j r_{00} b \beta \\
& + 192b^i b_j r_{00} r_0 b + 48b^i b_j r_{00} r_0 b^2 + 384b^i b_j r_{00} r_0 b^3 + 2304b^i s_j r_{00} b^3 \beta + 2368b^i s_j s_0 b \beta^2 - 2368b^i s_j r_0 b \beta^2 \\
& + 1536b^i s_j r_{00} b^5 \beta + 1024b^i s_j r_0 \beta^2 b^2 - 576s^i y_j s_0 \beta b^4 + 272y^i b_j r_{0s_0} b^2 - 128y^i b_j r_{0s_0} b^3 + 1408y^i s_j r_0 b^3 \beta
\end{aligned}$$

$$\begin{aligned}
& -256y^i b_j s_m s_0^m b^6 \beta - 1536b^i r_{j0} s_0 b^5 \beta + 240b^i r_{j0} s_0 b^2 \beta - 768b^i r_{j0} s_0 b \beta - 2304b^i r_{j0} s_0 b^3 \beta \\
& + 576b^i r_{j0} r_0 b^2 \beta - 768b^i r_{j0} r_0 b \beta - 2304b^i r_{j0} r_0 b^3 \beta + 384b^i r_{j0} s_0 \beta b^4 + 384b^i r_{j0} r_0 b^4 \beta - 1536b^i r_{j0} r_0 b^5 \beta \\
& - 2016b^i b_j s_m s_0^m b^2 \beta^2 + 64b^i y_j r_0 s_0 b^4 - 448y^i s_j s_0 b \beta - 1408y^i s_j s_0 b^3 \beta - 352y^i s_j r_0 b^2 \beta + 448y^i s_j r_0 b \beta \\
& - 1440b^i b_j s_0 b^2 \beta - 1344b^i b_j s_0 b^4 \beta - 256b^i y_j r_0 s_0 b^5 - 64b^i y_j r_0 s_0 b + 64b^i y_j r_0 s_0 b^2 - 256b^i y_j r_0 s_0 b^3 \\
& + 232y^i s_j s_0 b^2 \beta + 64y^i s_j s_0 \beta b^4 - 1024y^i s_j s_0 b^5 \beta - 256y^i s_j r_0 b^4 \beta + 1024y^i s_j r_0 b^5 \beta + 672b^i y_j s_m s_0^m b^2 \beta \\
& + 864b^i y_j s_m s_0^m b^4 \beta - 256b^i s_j s_0 \beta^2 b^4 + 432s^i b_j r_0 b^2 \beta + 288s^i b_j s_0 b^2 \beta^2 + 768s^i b_j r_0 b \beta^4 + 256s^i b_j r_0 b \beta^6 \\
& + 768b^i r_j r_0 b \beta + 2304b^i r_j r_0 b^3 \beta + 4736b^i r_j s_0 b \beta^2 - 256s^i y_j s_0 b^6 \beta - 744b^i s_j r_0 b^2 \beta - 112\delta_j^i r_0 s_0 b^4 \\
& + 5632b^i b_j s_0^2 b^3 \beta + 80b^i b_j r_0 s_0 \beta - 4096b^i s_j r_0 b^3 \beta^2 + 1024b^i s_j s_0 b^5 \beta^2 + 256b^i s_j r_0 b^4 \beta^2 - 1024b^i s_j r_0 b^5 \beta^2 \\
& + 4096b^i s_j s_0 b^3 \beta^2 + 1024\delta_j^i r_0 s_0 b^5 \beta + 512\delta_j^i r_0 s_0 b^4 \beta + 256b^i y_j s_m s_0^m b^6 \beta + 8192b^i r_j s_0 b^3 \beta^2 - 512b^i r_j s_0 b^2 b^4 \\
& + 2048b^i r_j s_0 b^5 \beta^2 + 704y^i r_j s_0 b^2 \beta - 896y^i r_j s_0 b \beta - 2816y^i r_j s_0 b^3 \beta + 512y^i r_j s_0 b^4 \beta - 576b^i r_j r_0 b^2 \beta \\
& - 2048b^i r_j s_0 b^2 \beta^2 - 384b^i r_j r_0 b^4 + 1536b^i r_j r_0 b^5 \beta - 1408b^i s_j s_0 b^2 \beta^2 - 384b^i s_j r_0 b \beta^4 - 64s_k^i s_0^k y_j \beta \\
& + 536r_0^i s_j \beta^2 + 864s^i s_j b^2 \beta^3 + 432s_k^i s_0^k b_j \beta^2 + 2592s_k^i s_0^k s_j^k b^2 \beta^3 + 1728s_k^i s_0^k s_j^k b^3 \beta^4 - 158880s_0^i s_0 j b^2 \beta \\
& - 381312s_0^i s_0 j \beta b^4 - 381312s_0^i s_0 j \beta b^6 - 127104s_0^i s_0 j \beta b^8 + 8r_0^i y_j s_0 - 12r_0^i b_j r_0 - 24b^i r_j r_0 b^2 \\
& + 2480b^i b_j s_0^2 \beta - 1440b^i b_j s_m s_0^m \beta^2 - 304b^i b_j r_0 s_m s_0^m \beta - 416b^i b_j s_0 b \beta + 192y^i s_j s_0 b^6 + 8y^i s_j r_0 b^4 \\
& - 48s^i y_j r_0 b^2 - 48b^i r_{j0} s_0 \beta - 384y^i b_j r_0 s_m s_0^m b^4 - 144y^i b_j r_0 s_m s_0^m b^2 - 48y^i b_j s_0 b^4 + 20y^i s_j r_0 b^2 \\
& + 16\delta_j^i r_0 s_0 b - 64\delta_j^i r_0 s_0 b^2 + 64\delta_j^i r_0 s_0 b^3 + 16\delta_j^i r_0 r_0 b + 32\delta_j^i r_0 r_0 b^2 + 256s_0^i b_j \beta b^8 + 1776b^i s_{j0} b^2 \beta^2 \\
& + 64\delta_j^i r_0 r_0 b^3 + 576b^i r_{j0} b^2 \beta + 864b^i r_{j0} b^4 + 256y^i b_j s_0^2 b^5 - 320y^i b_j r_0 s_m s_0^m b^6 + 672y^i s_{j0} b^2 \beta \\
& - 80y^i r_{j0} s_0 b^4 + 128y^i r_{j0} s_0 b^5 - 32y^i r_{j0} r_0 b^4 + 128y^i r_{j0} r_0 b^5 - 128y^i s_j r_0 b^3 - 128y^i s_j r_0 b^5 \\
& + 64\delta_j^i r_0 s_0 b^5 + 32\delta_j^i r_0 r_0 b^4 + 64\delta_j^i r_0 r_0 b^5 + 1536b^i s_{j0} \beta^2 b^4 + 256b^i s_{j0} \beta^2 b^6 + 1536s_0^i b_j \beta b^4 \\
& - 3552b^i s_{j0} b^2 \beta^2 - 3072b^i s_{j0} \beta^2 b^4 - 1144b^i s_j s_0 \beta^2 - 312b^i s_j r_0 \beta + 704s_0^i b_j b^2 \beta + 1280s_0^i b_j \beta b^6
\end{aligned}$$

$$\begin{aligned}
t_{11} := & 4s_k^i s_0^k y_j + 31776s_0^i s_0 j b^4 + 10592s_0^i s_0 j b^2 - 360s^i s_j \beta^2 - 312s_k^i s_j^k \beta^2 + 21184s_0^i s_0 j b^8 + 42368s_0^i s_0 j b^6 \\
& - 8r_0^i r_{j0} - 4y^i r_{k0} s_j^k - 8s_0^i b_j + 8\delta_j^i r_0 s_m s_0^m + 4\delta_j^i s_0 b - 4\delta_j^i s_0^2 - 8y^i s_0 b_j - 8b^i r_{j0} b + 8b^i r_0 b_j + 64s_0^i b_j \beta \\
& - 128s_0^i \beta + 4y^i s_0 b_j + 8y^i r_{kj} s_0^k + 8r_j^i r_0 + 96s_k^i s_0^k y_j b^4 + 32s_k^i s_0^k y_j b^2 + 64s_k^i s_0^k y_j b^8 + 128s_k^i s_0^k y_j b^6 \\
& + 72s_0^i b_j s_0 + 32\bar{R}_j^i b^2 + 64\bar{R}_j^i b^8 + 96\bar{R}_j^i b^4 + 128\bar{R}_j^i b^6 - 96b^i s_j s_0 + 120\delta_j^i s_m s_0^m \beta + 360b^i s_m s_0^m \beta^2 \\
& + 104b^i r_{k0} s_j^k \beta + 64\delta_j^i r_0 s_m s_0^m b^6 - 32\delta_j^i s_0^2 b + 208b^i s_0 b_j \beta - 60y^i s_m s_0^m \beta + 960s_0^i b_j \beta b^4 - 128\delta_j^i s_0^2 b^5 \\
& + 32\delta_j^i s_0 b^6 - 16\delta_j^i r_0 s_0 + 80\delta_j^i s_0^2 b^4 - 24y^i r_{k0} s_j^k b^2 - 32y^i r_{k0} s_j^k b^6 + 96y^i r_{kj} s_0^k b^4 + 48y^i r_{kj} s_0^k b^2 \\
& + 64y^i r_{kj} s_0^k b^6 + 48y^i s_0 b_j b^4 + 24y^i s_0 b_j b^2 + 32y^i s_0 b_j b^6 + 64b^i r_0 b_j b^6 - 8y^i s_j s_0 + 8s^i y_j s_0 + 28b^i s_j r_0 \\
& - 192s_0^i b_j b^4 - 64s_0^i b_j b^2 - 128s_0^i b_j b^8 - 256s_0^i b_j b^6 - 4s^i b_j r_0 + 48r_j^i r_0 b^2 + 96r_j^i r_0 b^4 \\
& + 64r_j^i r_0 b^6 + 16b^i r_j r_0 - 16y^i r_j s_0 - 128\delta_j^i s_0^2 b^3 + 96\delta_j^i r_0 s_m s_0^m b^4 + 48\delta_j^i r_0 s_m s_0^m b^2 + 24\delta_j^i s_0 b^2 \\
& + 48\delta_j^i s_0 b^4 - 48y^i r_{k0} s_j^k b^4 - 1920s_0^i \beta b^4 - 1792s_0^i \beta b^6 - 512s_0^i \beta b^8 - 96y^i s_0 b_j b^4 - 48y^i s_0 b_j b^2 \\
& - 64y^i s_0 b_j b^6 + 8b^i r_{j0} s_0 - 16b^i r_{j0} r_0 + 8y^i s_j r_0 - 8b^i y_j s_m s_0^m + 32b^i b_j r_0 s_m s_0^m + 40b^i b_j s_0 b - 496b^i b_j s_0^2 \\
& - 96b^i r_{j0} b^4 - 48b^i r_{j0} b^2 - 64b^i r_{j0} b^6 + 96b^i r_0 b_j b^4 + 48b^i r_0 b_j b^2 - 104b^i s_0 b_j \beta + 208r_j^i s_0 \beta \\
& + 416s_0^i b_j \beta^2 + 896s_0^i b_j \beta b^6 + 256s_0^i b_j \beta b^8 - 832s_0^i \beta b^2 - 208b^i r_{kj} s_0^k \beta - 104s^i r_{j0} \beta + 32\delta_j^i s_0^2 b^2 \\
& - 432b^i s_j s_0 b^2 - 576b^i s_j s_0 b^4 + 64b^i r_{j0} r_0 b - 64b^i r_{j0} r_0 b^2 + 256b^i r_{j0} r_0 b^3 - 64b^i r_{j0} s_0 b^4 + 256b^i r_{j0} s_0 b^5 \\
& - 64b^i r_{j0} r_0 b^4 + 256b^i r_{j0} r_0 b^5 + 64b^i r_j r_0 b^2 + 528b^i b_j s_m s_0^m \beta - 64b^i r_j r_0 b + 48s^i y_j s_0 b^2 + 96s^i y_j s_0 b^4 \\
& + 64s^i y_j s_0 b^6 + 16y^i s_j s_0 b^4 - 32\delta_j^i r_0 s_0 b - 64\delta_j^i r_0 s_0 b^2 + 64b^i r_{j0} s_0 b - 16b^i r_{j0} s_0 b^2 + 256b^i r_{j0} s_0 b^3 \\
& + 128y^i s_j s_0 b^5 + 32y^i s_j r_0 b^4 - 128y^i s_j r_0 b^5 - 128\delta_j^i r_0 s_0 b^5 - 64\delta_j^i r_0 s_0 b^4 - 256b^i s_0 b_j \beta b^6 + 960b^i s_0 b_j b^2 \beta \\
& + 1344b^i s_0 b_j \beta b^4 + 352b^i s_j s_0 \beta - 672b^i s_0 b_j \beta b^4 - 512b^i b_j s_0^2 b^5 + 128b^i b_j s_0 b^6 - 16b^i b_j r_0 s_0 \\
& - 448b^i b_j s_0^2 b^4 - 128b^i b_j r_0 s_m s_0^m b^6 - 512b^i b_j s_0^2 b - 784b^i b_j s_0^2 b^2 - 1280b^i b_j s_0^2 b^3 + 96b^i b_j r_0 s_m s_0^m b^2 \\
& + 192b^i b_j s_0 b^2 + 288b^i b_j s_0 b^4 - 64b^i y_j s_m s_0^m b^6 - 48b^i y_j s_m s_0^m b^2 - 96b^i y_j s_m s_0^m b^4 - 128\delta_j^i r_0 s_0 b^3
\end{aligned}$$

$$\begin{aligned}
& +512r_j^i s_0 b^6 \beta + 320b^i r_j s_0 \beta + 88b^i s_j r_{00} b^2 - 192b^i s_j s_0 b^6 + 64b^i s_j r_{00} b^4 + 960r_j^i s_0 b^2 \beta + 1344r_j^i s_0 \beta b^4 \\
& -160b^i s_j r_{00} \beta - 288y^i s_m s_0^m b^2 \beta - 432y^i s_m s_0^m \beta b^4 - 256b^i r_j r_{00} b^3 + 576\delta_j^i s_m s_0^m b^2 \beta + 864\delta_j^i s_m s_0^m b^4 \beta \\
& -960b^i r_{kj} s_0^k b^2 \beta + 64b^i r_j r_{00} b^4 - 256b^i r_j r_{00} b^5 + 64y^i r_j s_0 b - 64y^i r_j s_0 b^2 + 256y^i r_j s_0 b^3 - 64y^i r_j s_0 b^4 \\
& +256y^i r_j s_0 b^5 + 192y^i b_j s_m s_0^m b^4 + 48y^i b_j s_m s_0^m b^2 - 64b^i s_j r_{00} b + 4\bar{R}_j^i - 576s_k^i s_0^k b_j b^2 \beta + 1324s_0^i s_{0j} \\
& +432s_0^i b_j s_0 b^2 + 864s_0^i b_j s_0 b^4 + 576s_0^i b_j s_0 b^6 - 256r_0^i s_j \beta b^6 - 1152s_k^i s_0^k b_j \beta b^4 - 768s_k^i s_0^k b_j \beta b^6 \\
& +192r_0^i b_j s_0 b^2 + 288r_0^i b_j s_0 b^4 + 128r_0^i b_j s_0 b^6 - 480r_0^i s_j b^2 \beta - 672r_0^i s_j \beta b^4 + 960b^i b_j s_m s_0^m b^4 \beta \\
& -512b^i b_j r_{00} s_0 b^5 + 128b^i b_j r_{00} s_0 b^4 - 512b^i b_j r_{00} s_0 b + 32b^i b_j r_{00} s_0 b^2 - 640b^i s_j s_0 b \beta - 1792b^i s_j s_0 b^3 \beta \\
& -448b^i s_j r_{00} b^2 \beta + 640b^i s_j r_{00} b \beta + 1792b^i s_j r_{00} b^3 \beta - 1280b^i b_j r_{00} s_0 b^3 + 1536b^i b_j s_m s_0^m b^2 \beta - 96s^i b_j s_0 b^2 \beta \\
& -384s^i b_j s_0 \beta b^4 + 896b^i r_j s_0 b^2 \beta - 1280b^i r_j s_0 b \beta - 3584b^i r_j s_0 b^3 \beta + 688b^i s_j s_0 b^2 \beta + 1024b^i s_j r_{00} b^5 \beta \\
& -1024b^i s_j s_0 b^5 \beta - 256b^i s_j r_{00} b^4 \beta - 2048b^i r_j s_0 b^5 \beta + 512b^i r_j s_0 \beta b^4 + 256b^i s_j s_0 \beta b^4 - 104r_0^i s_j \beta \\
& -1008s^i s_j b^2 \beta^2 - 576s^i s_j \beta^2 b^4 - 96s_k^i s_0^k b_j \beta - 1440s_k^i s_j^k \beta^2 \beta^2 - 2016s_k^i s_j^k \beta^2 b^4 - 768s_k^i s_j^k \beta^2 b^6 \\
& -96r_0^i r_{j0} b^4 - 48r_0^i r_{j0} b^2 - 64r_0^i r_{j0} b^6 - 256b^i s_j r_{00} b^3 - 256b^i s_j r_{00} b^5 - 192y^i s_m s_0^m \beta b^6 \\
& +384\delta_j^i s_m s_0^m b^6 \beta + 576b^i s_m s_0^m \beta^2 b^4 + 192y^i b_j s_m s_0^m b^6 + 512b^i s_{0|j} \beta b^6 + 1008b^i s_m s_0^m b^2 \beta^2 \\
& -256s^i r_{j0} \beta b^6 - 512b^i r_{kj} s_0^k \beta b^6 - 480s^i r_{j0} b^2 \beta + 480b^i r_{k0} s_j^k b^2 \beta - 144s^i b_j r_{00} b^4 + 40r_0^i b_j s_0 \\
& -128y^i s_j r_{00} b^3 - 48s^i b_j r_{00} b^2 - 672s^i r_{j0} \beta b^4 - 128s^i b_j r_{00} b^6 + 32y^i s_j s_0 b - 8y^i s_j s_0 b^2 + 128y^i s_j s_0 b^3 \\
& -32y^i s_j r_{00} b + 32y^i s_j r_{00} b^2 - 480b^i s_{0|j} b^2 \beta + 48s^i b_j s_0 \beta - 1344b^i r_{kj} s_0^k \beta b^4 + 672b^i r_{k0} s_j^k \beta b^4 + 256b^i r_{k0} s_j^k \beta b^6 \\
t_{12} := & -(4(2b^2 + 1))(-2s_k^i s_0^k b_j - 22s^i s_j \beta - 14s_k^i s_j^k \beta - 2r_0^i s_j - 2b^i s_{0|j} + 4b^i s_{0|j} + 2b^i r_{k0} s_j^k + 2\delta_j^i s_m s_0^m \\
& +12s_{0|j}^i b^4 + 6s_{0|j}^i b^2 + 8s_{0|j}^i b^6 - 24s_{j0}^i b^4 - y^i s_m s_0^m - 2s^i r_{j0} - 4b^i r_{kj} s_0^k + 4r_j^i s_0 - 16s_{j0}^i b^6 - 12s_{j0}^i b^2 \\
& +8b^i r_{k0} s_j^k b^4 + 8b^i r_{k0} s_j^k b^2 - 16b^i r_{kj} s_0^k b^4 - 16b^i r_{kj} s_0^k b^2 - 8s^i r_{j0} b^4 - 8s^i r_{j0} b^2 - 8b^i s_{0|j} b^2 + 22b^i s_m s_0^m \beta \\
& +10b^i s_j s_0 - 8b^i s_{0|j} b^4 + 2s^i b_j s_0 + 16r_j^i s_0 b^2 + 16r_j^i s_0 b^4 + 8b^i r_j s_0 + 8\delta_j^i s_m s_0^m b^2 + 8\delta_j^i s_m s_0^m b^4 \\
& +16b^i s_{0|j} b^4 - 4b^i s_j r_0 - 4y^i s_m s_0^m b^4 - 4y^i s_m s_0^m b^2 + 16b^i b_j s_m s_0^m + 16b^i s_{0|j} b^2 - 32b^i r_j s_0 b \\
& -32b^i s_j s_0 b^3 + 40b^i b_j s_m s_0^m b^2 + 16b^i b_j s_m s_0^m b^4 + 8b^i s_j s_0 b^2 + 16b^i s_j r_0 b - 8b^i s_j r_0 b^2 + 32b^i s_j r_0 b^3 \\
& -16b^i r_j s_0 b^2 + 52b^i s_m s_0^m b^2 \beta + 16b^i s_m s_0^m \beta b^4 - 16s^i b_j s_0 b^4 - 64b^i r_j s_0 b^3 - 2s_{j0}^i + s_{0|j}^i \\
& -4s^i b_j s_0 b^2 - 8r_0^i s_j b^4 - 52s^i s_j b^2 \beta - 16s^i s_j \beta b^4 - 60s_k^i s_j^k b^2 \beta - 72s_k^i s_j^k \beta b^4 - 16b^i s_j s_0 b \\
& -16s_k^i s_j^k \beta b^6 - 8r_0^i s_j b^2 - 24s_k^i s_0^k b_j b^4 - 12s_k^i s_0^k b_j b^2 - 16s_k^i s_0^k b_j b^6) \\
t_{13} := & 4(2b^2 + 1)^3(-2s_k^i s_j^k b^2 - s_k^i s_j^k - 2s^i s_j + 2b^i s_m s_j^m).
\end{aligned}$$

## 7. APPENDIX 2: COEFFICIENTS IN (4)

$$\begin{aligned}
d_0 & := -288r_{00}^2(8n - 11)\beta^7, \\
d_1 & := 48\beta^6(-54r_{00|0}\beta + 80r_{00}^2nb^2 - 163r_{00}^2 - 104r_{00}^2b^2 + 124r_{00}^2n + 36r_{00|0}n\beta), \\
d_2 & := -24\beta^5(108\bar{\text{Ric}}\beta^2 + 384r_{00}s_0b\beta + 96r_{00}s_0n\beta + 198r_{00|0}n\beta - 192r_{00}s_0nb\beta - 192r_{00}r_0nb\beta \\
& -276r_{00|0}\beta - 120r_{00}s_0\beta + 384r_{00}r_0b\beta - 96r_{00}r_0n\beta - 192r_{00|0}\beta b^2 + 144r_{00}r_0\beta + 144r_{00|0}n\beta b^2 \\
& +64r_{00}^2nb^4 - 64r_{00}^2b^4 - 512r_{00}^2b^2 + 392r_{00}^2nb^2 - 360r_{00}^2 + 273r_{00}^2n) \\
d_3 & := 12\beta^4(784r_{00}r_0\beta + 462r_{00|0}n\beta - 224r_{00|0}b^4\beta - 112r_{00}s_0\beta - 800r_{00|0}\beta b^2 + 288r_{00}^2nb^4 \\
& +808r_{00}^2nb^2 + 288r_{0m}s_0^m n\beta^2 + 144s_{0|0}n\beta^2 + 144r_{00}r_m^m\beta^2 + 144r_{00|m}b^m\beta^2 - 144r_{0m|0}b^m\beta^2 \\
& +336r_{00}s_0n\beta + 1632r_{00}s_0b\beta - 512r_{00}s_0\beta b^2 + 768r_{00}s_0\beta b^3 - 464r_{00}r_0n\beta + 1632r_{00}r_0b\beta \\
& -512r_{00}s_0nb^3\beta + 384r_{00}s_0nb^2\beta - 928r_{00}r_0nb\beta - 512r_{00}r_0nb^3\beta - 256r_{00}r_0nb^2\beta + 320r_{00}r_0\beta b^2 \\
& +696r_{00|0}n\beta b^2 + 192r_{00|0}n\beta b^4 - 468r_{00}^2 - 256r_{00}^2b^4 - 1184r_{00}^2b^2 + 335r_{00}^2n - 596r_{00|0}\beta + 768r_{00}r_0\beta b^3 \\
& -144r_{0m}r_m^m\beta^2 - 288r_{0m}s_0^m\beta^2 - 360s_{0|0}\beta^2 + 612\bar{\text{Ric}}\beta^2 + 576\bar{\text{Ric}}\beta^2b^2 - 928r_{00}s_0nb\beta)
\end{aligned}$$



$$\begin{aligned}
d_4 := & -2\beta^3(5360r_{00}r_0\beta + 1778r_{00|0}n\beta - 2112r_{00|0}b^4\beta - 256r_{00|0}b^6\beta + 2144r_{00}s_0\beta - 3936r_{00|0}\beta b^2 \\
& + 6912s_0^2b\beta^2 + 576rr_{00}\beta^2 + 2304r_0^2b\beta^2 - 288r_0s_0\beta^2 + 1584r_0^2nb^4 + 2712r_0^2nb^2 \\
& - 1728r_0mr_0^m b^2\beta^2 + 3888r_0ms_0^m n\beta^2 - 2880r_0ms_0^m \beta^2 b^2 + 1944s_{0|0}n\beta^2 - 4032s_{0|0}\beta^2 b^2 \\
& + 2160r_0r_0^m \beta^2 + 2160r_{00|m}b^m \beta^2 - 2160r_{0m|0}b^m \beta^2 + 1384r_{00}r_0n\beta - 2304s_0^2nb\beta^2 \\
& + 8416r_{00}r_0b\beta - 4288r_{00}r_0\beta b^2 + 1024r_{00}r_0\beta b^5 + 6400r_{00}r_0\beta b^3 - 2768r_{00}r_0n\beta \\
& + 8416r_{00}r_0b\beta + 1024r_{00}r_0nb^4\beta - 5536r_{00}r_0nb\beta - 6400r_{00}r_0nb^3\beta - 1024r_{00}r_0nb^5\beta \\
& + 4288r_{00}r_0nb^2\beta - 512r_{00}r_0nb^4\beta - 5536r_{00}r_0nb\beta - 6400r_{00}r_0nb^3\beta - 1024r_{00}r_0nb^5\beta \\
& - 3200r_{00}r_0nb^2\beta - 2304r_0s_0nb\beta^2 + 4352r_{00}r_0\beta b^2 + 512r_{00}r_0\beta b^4 + 1024r_{00}r_0\beta b^5 \\
& + 6400r_{00}r_0\beta b^3 + 4152r_{00|0}n\beta b^2 + 2400r_{00|0}n\beta b^4 + 256r_{00|0}n\beta b^6 - 1024r_{00}r_0b^4\beta \\
& - 2304rr_{00}b\beta^2 - 1152r_0s_0n\beta^2 + 8064r_0s_0b\beta^2 + 3456r_0ms_0^m n\beta^2 b^2 - 1149r_0^2 \\
& - 1440r_0^2b^4 - 4944r_0^2b^2 + 753r_0^2n - 2120r_{00|0}\beta - 144s_0^2\beta^2 - 576r_0^2\beta^2 - 2160r_0mr_0^m \beta^2 \\
& - 3168r_0ms_0^m \beta^2 - 4824s_{0|0}\beta^2 - 1296s_{0|m}^m \beta^3 + 4428\overline{\text{Ric}}\beta^2 + 3456\overline{\text{Ric}}\beta^2 b^4 \\
& + 8640\overline{\text{Ric}}\beta^2 b^2 + 1728s_{0|0}n\beta^2 b^2 + 1728r_{00}r_0r_0^m b^2\beta^2 + 1728r_{00|m}b^m b^2\beta^2 - 1728r_{0m|0}b^m b^2\beta^2)
\end{aligned}$$

$$\begin{aligned}
d_5 := & -\beta^2(-6544r_{00}r_0\beta - 1354r_{00|0}n\beta + 2112r_{00|0}b^4\beta + 512r_{00|0}b^6\beta - 5488r_{00}r_0\beta + 3168r_{00|0}\beta b^2 \\
& + 1632s_0^2n\beta^2 + 1920s_0^2\beta^2 b^2 - 15360s_0^2b^3\beta^2 - 21504s_0^2b\beta^2 - 2496rr_{00}\beta^2 + 2304r_{0m|0}b^m b^4\beta^2 \\
& + 1536r_0^2b^2\beta^2 - 9984r_0^2b\beta^2 - 6144r_0^2b^3\beta^2 - 2400r_0s_0\beta^2 - 1488r_0^2nb^4 - 1752r_0^2nb^2 \\
& + 7488r_0mr_0^m b^2\beta^2 + 2304r_0mr_0^m b^4\beta^2 - 7200r_0ms_0^m n\beta^2 + 7104r_0ms_0^m \beta^2 b^2 \\
& + 3072r_0ms_0^m \beta^2 b^4 - 3600s_{0|0}n\beta^2 + 14784s_{0|0}\beta^2 b^2 + 4992s_{0|0}\beta^2 b^4 - 1728s_m s_0^m n\beta^3 \\
& - 4464r_{00}r_0r_0^m \beta^2 - 4464r_{00|m}b^m \beta^2 + 4464r_{0m|0}b^m \beta^2 - 648s_m s_0^m \beta^2 - 1728r_0r_0^m \beta^3 \\
& - 1728s_{0|m}b^m \beta^3 + 864s_{m|0}b^m \beta^3 + 6912s_{0|m}^m \beta^3 b^2 - 992r_{00}r_0n\beta - 7520r_{00}r_0b\beta \\
& + 5312r_{00}r_0\beta b^2 - 512r_{00}r_0\beta b^5 - 4352r_{00}r_0\beta b^3 + 2896r_{00}r_0n\beta - 7520r_{00}r_0b\beta - 3584r_{00}r_0nb^4\beta \\
& + 5792r_{00}r_0nb\beta + 10496r_{00}r_0nb^3\beta + 3584r_{00}r_0nb^5\beta - 6656r_{00}r_0nb^2\beta + 1792r_{00}r_0nb^4\beta \\
& + 5792r_{00}r_0nb\beta + 10496r_{00}r_0nb^3\beta + 3584r_{00}r_0nb^5\beta + 5248r_{00}r_0nb^2\beta + 8832r_0s_0nb\beta^2 \\
& + 6144r_0s_0nb^3\beta^2 + 3072r_0s_0n\beta^2 b^2 - 7936r_{00}r_0\beta b^2 - 1792r_{00}r_0\beta b^4 - 512r_{00}r_0\beta b^5 \\
& - 4352r_{00}r_0\beta b^3 - 4344r_{00|0}n\beta b^2 - 3936r_{00|0}n\beta b^4 - 896r_{00|0}n\beta b^6 + 2048r_{00}r_0b^4\beta + 8832s_0^2nb\beta^2 \\
& + 6144s_0^2nb^3\beta^2 - 768s_0^2n\beta^2 b^2 - 1536rr_{00}b^2\beta^2 + 9984rr_{00}b\beta^2 + 6144rr_{00}b^3\beta^2 \\
& + 4416r_0s_0n\beta^2 + 1536r_0s_0\beta^2 b^2 - 18432r_0s_0b^3\beta^2 - 28800r_0s_0b\beta^2 - 13248r_0ms_0^m n\beta^2 b^2 \\
& - 4608r_0ms_0^m n\beta^2 b^4 + 567r_0^2 + 1632r_0^2b^4 + 4200r_0^2b^2 - 351r_0^2n + 1498r_{00|0}\beta - 5520s_0^2\beta^2 \\
& + 2496r_0^2\beta^2 + 4464r_0mr_0^m \beta^2 + 4512r_0ms_0^m \beta^2 + 8952s_{0|0}\beta^2 + 3456s_m s_0^m \beta^3 \\
& - 2592s_m r_0^m \beta^3 + 1728r_m s_0^m \beta^3 + 6048s_{0|m}^m \beta^3 - 5892\overline{\text{Ric}}\beta^2 - 14976\overline{\text{Ric}}\beta^2 b^4 \\
& - 17856\overline{\text{Ric}}\beta^2 b^2 - 3072\overline{\text{Ric}}\beta^2 b^6 - 6624s_{0|0}n\beta^2 b^2 - 2304s_{0|0}n\beta^2 b^4 + 7488r_{0m|0}b^m b^2\beta^2 \\
& - 7488r_{00}r_0r_0^m b^2\beta^2 - 2304r_{00}r_0r_0^m b^4\beta^2 - 7488r_{00|m}b^m b^2\beta^2 - 2304r_{00|m}b^m b^4\beta^2)
\end{aligned}$$

$$\begin{aligned}
d_6 := & 2\beta(-1128r_{00}r_0\beta - 153r_{00|0}n\beta + 96r_{00|0}b^4\beta - 1386r_{00}r_0\beta + 312r_{00|0}\beta b^2 + 1148s_0^2n\beta^2 \\
& - 2976s_0^2\beta^2 b^2 + 384s_0^2\beta^2 b^4 - 2048s_0^2b^5\beta^2 - 6272s_0^2b^3\beta^2 - 6368s_0^2b\beta^2 - 1072rr_{00}\beta^2 \\
& + 1408r_0^2b^2\beta^2 + 256r_0^2b^4\beta^2 - 4288r_0^2b\beta^2 - 5632r_0^2b^3\beta^2 - 1024r_0^2b^5\beta^2 - 2208r_0s_0\beta^2 \\
& - 180r_0^2nb^4 - 156r_0^2nb^2 + 3216r_0mr_0^m b^2\beta^2 + 2112r_0mr_0^m b^4\beta^2 + 256r_0mr_0^m b^6\beta^2 - 1728s_0r_0r_0^m \beta^3 b^2 \\
& - 1756r_0ms_0^m n\beta^2 + 1008r_0ms_0^m \beta^2 b^2 + 768r_0ms_0^m \beta^2 b^4 + 256r_0ms_0^m b^6\beta^2 - 878s_{0|0}n\beta^2 \\
& + 5328s_{0|0}\beta^2 b^2 + 3552s_{0|0}\beta^2 b^4 + 512s_{0|0}b^6\beta^2 - 576rs_0\beta^3 - 1512s_m s_0^m n\beta^3 + 3168s_m s_0^m \beta^3 b^2 \\
& + 2592s_m r_0^m \beta^3 b^2 + 1728r_m s_0^m \beta^3 b^2 - 1220r_{00}r_0r_0^m \beta^2 - 1220r_{00|m}b^m \beta^2 + 1220r_{0m|0}b^m \beta^2 \\
& - 432s_m s_0^m \beta^2 - 1728s_0r_0r_0^m \beta^3 - 1728s_{0|m}b^m \beta^3 + 864s_{m|0}b^m \beta^3 + 6912s_{0|m}^m \beta^3 b^2 + 864s_{m|0}b^m \beta^3 b^2 \\
& + 3456s_{0|m}^m \beta^3 b^4 - 114r_{00}r_0n\beta - 936r_{00}r_0b\beta + 1200r_{00}r_0\beta b^2 + 1152r_{00}r_0\beta b^5 - 1728s_{0|m}b^m \beta^3 b^2
\end{aligned}$$

$$\begin{aligned}
& +576r_{00}s_0\beta b^3 + 420r_{00}r_0n\beta - 936r_{00}r_0b\beta - 1248r_{00}s_0nb^4\beta + 840r_{00}s_0nb\beta + 2112r_{00}s_0nb^3\beta \\
& +1152r_{00}s_0nb^5\beta - 1392r_{00}s_0nb^2\beta + 576r_{00}r_0nb^4\beta + 840r_{00}r_0nb\beta + 2112r_{00}r_0nb^3\beta \\
& +1152r_{00}r_0nb^5\beta + 1056r_{00}r_0nb^2\beta + 3328r_{00}s_0nb\beta^2 + 4864r_{00}s_0nb^3\beta^2 + 1024r_{00}s_0nb^5\beta^2 \\
& +2432r_{00}s_0n\beta^2b^2 + 512r_{00}s_0n\beta^2b^4 - 1824r_{00}r_0\beta b^2 - 576r_{00}r_0\beta b^4 + 1152r_{00}r_0\beta b^5 - 864s_m s_0^m b^2 \beta^2 \\
& +576r_{00}r_0\beta b^3 - 630r_{00|0}n\beta b^2 - 792r_{00|0}n\beta b^4 - 288r_{00|0}n\beta b^6 + 384r_{00}s_0b^4\beta + 3328s_0^m n\beta b^2 \\
& +4864s_0^m n\beta^3 b^2 + 1024s_0^m n\beta^5 b^2 + 1376s_0^m n\beta^2 b^2 - 256s_0^m n\beta^2 b^4 - 1408r_{00}b^2 \beta^2 + 256r_{00|m}b^m b^6 \beta^2 \\
& -256r_{00}b^4 \beta^2 + 4288r_{00}b\beta^2 + 5632r_{00}b^3 \beta^2 + 1024r_{00}b^5 \beta^2 + 1664r_{00}n\beta^2 + 2112r_{00|m}b^m b^4 \beta^2 \\
& -2208r_{00}s_0\beta^2 b^2 + 384r_{00}s_0\beta^2 b^4 - 2560r_{00}s_0\beta^5 \beta^2 - 11776r_{00}s_0\beta^3 \beta^2 - 10144r_{00}s_0b\beta^2 \\
& -4992r_{00}s_0^m n\beta^2 b^2 - 3648r_{00}s_0^m n\beta^2 b^4 + 36r_{00}^2 + 264r_{00}^2 b^4 + 492r_{00}^2 b^2 + 3216r_{00|m}b^m b^2 \beta^2 \\
& -24r_{00}^2 n + 159r_{00|0}\beta - 4932s_0^m \beta^2 + 1072r_0^2 \beta^2 + 1220r_{00}r_0^m \beta^2 + 776r_{00}s_0^m \beta^2 - 256r_{00|m}b^m b^6 \beta^2 \\
& +2218s_{0|0}\beta^2 + 2880s_m s_0^m \beta^3 + 2592s_m r_0^m \beta^3 + 1728r_m s_0^m \beta^3 + 2916s_{0|m}\beta^3 - 2112r_{00}r_m^m b^4 \beta^2 \\
& -1168\overline{\text{Ric}}\beta^2 + 324s_m^i s_m^m \beta^4 - 6432\overline{\text{Ric}}\beta^2 b^4 - 256\overline{\text{Ric}}\beta^2 b^8 - 4880\overline{\text{Ric}}\beta^2 b^2 - 256r_{00}r_m^m b^6 \beta^2 \\
& -2816\overline{\text{Ric}}\beta^2 b^6 - 512r_{00}r_m^m n\beta^2 b^6 - 2496s_{0|0}n\beta^2 b^2 - 1824s_{0|0}n\beta^2 b^4 - 3216r_{00|m}b^m b^2 \beta^2 \\
& -256s_{0|0}n\beta^2 b^6 + 2304r_{00}b\beta^3 - 1728s_m s_0^m n\beta^3 b^2 - 3216r_{00}r_m^m b^2 \beta^2 - 2112r_{00|m}b^m b^4 \beta^2) \\
d_7 = & (416r_{00}r_0\beta + 38r_{00|0}n\beta + 120r_{00|0}b^4\beta + 128r_{00|0}b^6\beta + 680r_{00}s_0\beta - 48r_{00|0}\beta b^2 - 1172s_0^m n\beta^2 \\
& +9280s_0^m \beta^2 b^2 + 6016s_0^m \beta^2 b^4 - 2048s_0^m \beta^5 b^2 - 128s_0^m \beta^3 b^2 + 3616s_0^m b\beta^2 + 912r_{00}\beta^2 + 24r_{00}^2 n\beta^2 \\
& -1920r_0^2 b^2 \beta^2 - 768r_0^2 b^4 \beta^2 + 3648r_0^2 b\beta^2 + 7680r_0^2 b^3 \beta^2 + 3072r_0^2 b^5 \beta^2 - 2736r_{00}r_0^m b^2 \beta^2 \\
& +2624r_{00}s_0\beta^2 36r_{00}^2 n\beta^4 - 2880r_{00}r_0^m b^4 \beta^2 - 768r_{00}r_0^m b^6 \beta^2 + 952r_{00}s_0^m n\beta^2 - 3840s_m s_0^m \beta^3 b^4 \\
& +624r_{00}s_0^m \beta^2 b^2 + 1536r_{00}s_0^m \beta^2 b^4 + 256r_{00}s_0^m b^6 \beta^2 + 476s_{0|0}n\beta^2 - 3792s_{0|0}\beta^2 b^2 \\
& + -3552s_{0|0}\beta^2 b^4 - 1024s_{0|0}b^6 \beta^2 + 1920r_{00}\beta^3 + 2088s_m s_0^m n\beta^3 - 7872s_m s_0^m \beta^3 b^2 \\
& -8640s_m r_0^m \beta^3 b^2 - 3456s_m r_0^m \beta^3 b^4 - 5760r_m s_0^m \beta^3 b^2 - 2304r_m s_0^m \beta^3 b^4 + 744r_{00}r_m^m \beta^2 \\
& +744r_{00|m}b^m \beta^2 - 744r_{00|m}b^m \beta^2 + 432s_m s_0^m \beta^2 + 2736s_0 r_m^m \beta^3 + 2736s_{0|m}b^m \beta^3 - 1664r_{00}r_0\beta b^5 \\
& -1368s_m |0 b^m \beta^3 - 10944s_{0|m}\beta^3 b^2 - 11520s_{0|m}\beta^3 b^4 - 3072s_{0|m}\beta^3 b^6 - 5632r_{00}s_0nb^3 \beta^2 \\
& +40r_{00}s_0n\beta + 256r_{00}s_0b\beta - 784r_{00}s_0\beta b^2 - 1664r_{00}s_0\beta b^5 - 896r_{00}s_0\beta b^3 - 128r_{00}r_0n\beta + 256r_{00}r_0b\beta \\
& +832r_{00}s_0nb^4\beta - 256r_{00}s_0nb\beta - 832r_{00}s_0nb^3\beta - 640r_{00}s_0nb^5\beta + 640r_{00}s_0nb^2\beta - 320r_{00}r_0nb^4\beta \\
& -256r_{00}r_0nb\beta - 832r_{00}r_0nb^3\beta - 640r_{00}r_0nb^5\beta - 416r_{00}r_0nb^2\beta - 2464r_{00}s_0nb\beta^2 - 896r_{00}r_0\beta b^3 \\
& -2560r_{00}s_0nb^5\beta^2 - 2816r_{00}s_0n\beta^2 b^2 - 1280r_{00}s_0n\beta^2 b^4 + 848r_{00}r_0\beta b^2 + 320r_{00}r_0\beta b^4 - 1728s_m^i s_m^m \beta^4 b^2 \\
& +192r_{00|0}n\beta b^2 + 312r_{00|0}n\beta b^4 + 160r_{00|0}n\beta b^6 - 256r_{00}s_0b^4\beta - 2464s_0^m n\beta b^2 - 5632s_0^m n\beta^3 \beta^2 \\
& -2560s_0^m n\beta^5 \beta^2 - 3392s_0^m n\beta^2 b^2 - 3968s_0^m n\beta^2 b^4 + 1920r_{00}b^2 \beta^2 + 768r_{00}b^4 \beta^2 - 3648r_{00}b\beta^2 \\
& -7680r_{00}b^3 \beta^2 - 3072r_{00}b^5 \beta^2 - 1232r_{00}s_0n\beta^2 + 6368r_{00}s_0\beta^2 b^2 + 3968r_{00}s_0\beta^2 b^4 + 3584r_{00}s_0b^5 \beta^2 \\
& +9728r_{00}s_0b^3 \beta^2 + 7136r_{00}s_0b\beta^2 + 3696r_{00}s_0^m n\beta^2 b^2 + 4224r_{00}s_0^m n\beta^2 b^4 - 3r_{00}^2 - 72r_{00}^2 b^4 \\
& -96r_{00}^2 b^2 + 3r_{00}^2 n - 38r_{00|0}\beta + 6340s_0^m \beta^2 - 912r_0^2 \beta^2 - 744r_{00}r_0^m \beta^2 - 256r_{00}s_0^m \beta^2 - 1244s_{0|0}\beta^2 \\
& -3840s_m s_0^m \beta^3 - 4104s_m r_0^m \beta^3 - 2736r_m s_0^m \beta^3 - 2976s_{0|m}\beta^3 + 552\overline{\text{Ric}}\beta^2 - 864s_m s_m \beta^4 \\
& -1188s_m^i s_m^m \beta^4 + 5472\overline{\text{Ric}}\beta^2 b^4 + 768\overline{\text{Ric}}\beta^2 b^8 + 2976\overline{\text{Ric}}\beta^2 b^2 + 3840\overline{\text{Ric}}\beta^2 b^6 - 6144r_{00}\beta^3 b^3 \\
& +1280r_{00}s_0^m n\beta^2 b^6 + 1848s_{0|0}n\beta^2 b^2 + 2112s_{0|0}n\beta^2 b^4 + 640s_{0|0}n\beta^2 b^6 + 1536r_{00}\beta^3 b^2 \\
& -7680r_{00}b\beta^3 + 4896s_m s_0^m n\beta^3 b^2 + 2304s_m s_0^m n\beta^3 b^4 + 2736r_{00}r_m^m b^2 \beta^2 + 2880r_{00}r_m^m b^4 \beta^2 \\
& +768r_{00}r_m^m b^6 \beta^2 + 2736r_{00|m}b^m b^2 \beta^2 + 2880r_{00|m}b^m b^4 \beta^2 + 768r_{00|m}b^m b^6 \beta^2 - 2736r_{00|m}b^m b^2 \beta^2 \\
& -2880r_{00|m}b^m b^4 \beta^2 - 768r_{00|m}b^m b^6 \beta^2 + 1728s_m s_0^m b^4 \beta^2 + 1728s_m s_0^m b^2 \beta^2 + 5760s_0 r_m^m \beta^3 b^2 \\
& +2304s_0 r_m^m \beta^3 b^4 + 5760s_{0|m}b^m \beta^3 b^2 + 2304s_{0|m}b^m \beta^3 b^4 - 2880s_{0|m}b^m \beta^3 b^2 - 1152s_{0|m}b^m \beta^3 b^4) \\
d_8 = & 64r_{00}s_0b^4 + 112r_{00}s_0b^2 - 4r_{00}s_0n + 320r_{00}s_0b^5 + 128r_{00}s_0b^3 - 16r_{00}s_0b - 32r_{00}r_0b^4 \\
& -80r_{00}r_0b^2 + 8r_{00}r_0n + 320r_{00}r_0b^5 + 128r_{00}r_0b^3 - 16r_{00}r_0b - 12r_{00|0}n\beta^2 + 4352s_0^m \beta b^5 \\
& -24r_{00|0}nb^4 - 16r_{00|0}nb^6 + 256s_0^m n\beta - 3904s_0^m \beta b^2 - 5440s_0^m \beta b^4 - 512s_0^m \beta b + 2048s_0^m \beta b^3
\end{aligned}$$

$$\begin{aligned}
& -2816s_0^2\beta b^6 + 1024s_0^2\beta b^7 - 192rr_0\beta + 576r_0^2b^2\beta + 384r_0^2b^4\beta - 768r_0^2b\beta - 2304r_0^2b^3\beta \\
& -1536r_0^2b^5\beta - 672r_0s_0\beta + 576r_0mr_0^m b^2\beta + 864r_0mr_0^m b^4\beta + 384r_0mr_0^m b^6\beta - 384r_0ms_0^m \beta b^2 \\
& -1152r_0ms_0^m \beta b^4 - 136r_0ms_0^m n\beta - 640r_0ms_0^m \beta b^6 + 672s_{0|0}\beta b^2 + 720s_{0|0}\beta b^4 - 68s_{0|0}n\beta \\
& +256s_{0|0}\beta b^6 - 1184rs_0\beta^2 - 712s_m s_0^m n\beta^2 + 3504s_m s_0^m \beta^2 b^2 + 3072s_m s_0^m \beta^2 b^4 + 768s_m s_0^m b^6 \beta^2 \\
& +5328s_m r_0^m b^2 \beta^2 + 4608s_m r_0^m \beta^2 b^4 + 768s_m r_0^m \beta^2 b^6 + 3552r_m s_0^m b^2 \beta^2 + 3072r_m s_0^m \beta^2 b^4 \\
& +512r_m s_0^m \beta^2 b^6 - 120r_0r_0^m \beta - 120r_{0|0}b^m \beta + 120r_{0m|0}b^m \beta - 96s_m s_0^m \beta - 1072s_0r_m^m \beta^2 \\
& -1072s_{0|m}b^m \beta^2 + 536s_{m|0}b^m \beta^2 + 4288s_{0|m}^m \beta^2 b^2 + 7104s_{0|m}^m \beta^2 b^4 + 4096s_{0|m}^m b^6 \beta^2 + 448r_0s_0nb\beta \\
& +512s_{0|m}^m \beta^2 b^8 + 1296s_m s^m \beta^3 + 864s_m^i s_i^m \beta^3 - 112r_0s_0nb^4 + 16r_0s_0nb + 64r_0s_0nb^3 \\
& +64r_0s_0nb^5 - 64r_0s_0nb^2 + 32r_0r_0nb^4 + 16r_0r_0nb + 64r_0r_0nb^3 + 64r_0r_0nb^5 + 448s_0^2nb\beta \\
& +1408r_0s_0nb^3\beta + 1024r_0s_0nb^5\beta + 704r_0s_0n\beta b^2 + 512r_0s_0n\beta b^4 + 32r_0r_0nb^2 + 1408s_0^2nb^3\beta \\
& +1024s_0^2nb^5\beta + 1184s_0^2n\beta b^2 + 2912s_0^2n\beta b^4 + 2560s_0^2n\beta b^6 - 576rr_0b^2\beta - 384rr_0b^4\beta \\
& +768rr_0b\beta + 2304rr_0b^3\beta + 1536rr_0b^5\beta + 224r_0s_0n\beta - 2528r_0s_0\beta b^2 - 3584r_0s_0\beta b^4 \\
& -1280r_0s_0b\beta - 1280r_0s_0\beta b^3 + 256r_0s_0\beta b^5 - 1280r_0s_0\beta b^6 - 672r_0ms_0^m n\beta b^2 - 68r_0s_0 \\
& -1056r_0ms_0^m n\beta b^4 - 512r_0ms_0^m nb^6\beta + 2r_{0|0} - 32r_{00}r_0 - 2r_{0|0}n - 24r_{0|0}b^4 - 32r_{0|0}b^6 \\
& -1808s_0^2\beta + 192r_0^2\beta + 120r_0mr_0^m \beta + 16r_0ms_0^m \beta + 188s_{0|0}\beta + 1296s_m s_0^m \beta^2 + 2592s_m^i s_i^m \beta^3 b^2 \\
& +1608s_m r_0^m \beta^2 + 1072r_m s_0^m \beta^2 + 848s_{0|m}^m \beta^2 - 72\overline{\text{Ric}}\beta - 1152\overline{\text{Ric}}\beta b^4 - 384\overline{\text{Ric}}\beta b^8 \\
& -480\overline{\text{Ric}}\beta b^2 - 1152\overline{\text{Ric}}\beta b^6 - 336s_{0|0}n\beta b^2 - 528s_{0|0}n\beta b^4 - 256s_{0|0}nb^6\beta + 2048rs_0b^5\beta^2 \\
& -2048rs_0b^2\beta^2 + 4736rs_0b\beta^2 + 8192rs_0b^3\beta^2 - 2544s_m s_0^m n\beta^2 b^2 - 2496s_m s_0^m n\beta^2 b^4 \\
& -512s_m s_0^m nb^6\beta^2 - 512rs_0b^4\beta^2 - 576r_0r_0^m b^2\beta - 864r_0r_0^m b^4\beta - 384r_0r_0^m b^6\beta \\
& -576r_{0|0}b^m b^2\beta - 864r_{0|0}b^m b^4\beta - 384r_{0|0}b^m b^6\beta + 576r_{0m|0}b^m b^2\beta + 864r_{0m|0}b^m b^4\beta \\
& +384r_{0m|0}b^m b^6\beta + 1728s_m^i s_i^m \beta^3 b^4 - 576s_m s_0^m \beta b^2 - 1152s_m s_0^m \beta b^4 - 768s_m s_0^m \beta b^6 \\
& -3552s_0r_m^m b^2 \beta^2 - 3072s_0r_m^m \beta^2 b^4 - 512s_0r_m^m \beta^2 b^6 - 3552s_{0|m}b^m b^2 \beta^2 - 3072s_{0|m}b^m \beta^2 b^4 \\
& -512s_{0|m}b^m \beta^2 b^6 + 1776s_{m|0}b^m b^2 \beta^2 + 1536s_{m|0}b^m \beta^2 b^4 + 256s_{m|0}b^m \beta^2 b^6 + 1728s_m s^m \beta^3 b^2
\end{aligned}$$

$$\begin{aligned}
d_9 := & 4\overline{\text{Ric}} - 128s_0^2nb^2 - 496s_0^2nb^4 - 896s_0^2nb^6 - 32s_0^2nb - 128s_0^2nb^3 - 128s_0^2nb^5 - 512s_0^2nb^8 \\
& +64rr_0b^2 + 64rr_0b^4 - 64rr_0b - 256rr_0b^3 - 256rr_0b^5 - 16r_0s_0n + 320r_0s_0b^2 + 704r_0s_0b^4 \\
& +640r_0s_0b^6 - 384r_0s_0b^5 + 96r_0s_0b + 48r_0ms_0^m nb^2 + 96r_0ms_0^m nb^4 + 64r_0ms_0^m nb^6 \\
& +24s_{0|0}nb^2 + 48s_{0|0}nb^4 + 32s_{0|0}nb^6 + 320rs_0\beta + 120s_m s_0^m n\beta - 672s_m s_0^m \beta b^2 - 576s_m s_0^m \beta b^4 \\
& -256s_m s_0^m \beta b^6 - 1440s_m r_0^m \beta b^2 - 2016s_m r_0^m \beta b^4 - 768s_m r_0^m \beta b^6 - 960r_m s_0^m \beta b^2 + 64s_m s_0^m b^2 \\
& -1344r_m s_0^m \beta b^4 - 512r_m s_0^m \beta b^6 + 48r_0r_0^m b^2 + 96r_0r_0^m b^4 + 64r_0r_0^m b^6 + 48r_{0|0}b^m b^2 \\
& +96r_{0|0}b^m b^4 + 64r_{0|0}b^m b^6 - 48r_{0m|0}b^m b^2 - 96r_{0m|0}b^m b^4 - 64r_{0m|0}b^m b^6 + 192s_m s_0^m b^4 \\
& +256s_m s_0^m b^6 + 128s_m s_0^m b^8 + 208s_0r_m^m \beta + 208s_{0|m}b^m \beta - 104s_{m|0}b^m \beta - 832s_{0|m}^m \beta b^2 \\
& -1920s_{0|m}^m \beta b^4 - 1792s_{0|m}^m \beta b^6 - 512s_{0|m}^m \beta b^8 - 720s_m s^m \beta^2 - 312s_m^i s_i^m \beta^2 - 64r_0s_0nb^2 \\
& -64r_0s_0nb^4 - 32r_0s_0nb - 128r_0s_0nb^3 - 128r_0s_0nb^5 - 8r_0mr_0^m + 16rr_0 + 8r_0r_0^m + 8r_{0|0}b^m \\
& -8r_{0m|0}b^m + 196s_0^2 - 16r_0^2 - 12s_{0|0} - 20s_0^2n + 512s_0^2b^2 + 1120s_0^2b^4 + 1152s_0^2b^6 - 384s_0^2b^3 \\
& -512s_0^2b^7 - 1152s_0^2b^5 + 32s_0^2b + 512s_0^2b^8 - 64r_0^2b^2 - 64r_0^2b^4 + 64r_0^2b + 256r_0^2b^3 + 256r_0^2b^5 \\
& +64r_0s_0 - 48r_0mr_0^m b^2 - 96r_0mr_0^m b^4 - 64r_0mr_0^m b^6 + 48r_0ms_0^m b^2 + 192r_0ms_0^m b^4 + 192r_0ms_0^m b^6 \\
& +8r_0ms_0^m n - 48s_{0|0}b^2 - 48s_{0|0}b^4 + 4s_{0|0}n - 224s_m s_0^m \beta - 312s_m r_0^m \beta - 208r_m s_0^m \beta \\
& +8s_m s_0^m - 128s_{0|m}^m \beta + 96\overline{\text{Ric}}b^4 + 64\overline{\text{Ric}}b^8 + 32\overline{\text{Ric}}b^2 + 128\overline{\text{Ric}}b^6 - 1280rs_0b\beta + 896rs_0\beta b^2 \\
& +512rs_0\beta b^4 - 2048rs_0\beta b^5 - 3584rs_0\beta b^3 + 576s_m s_0^m n\beta b^2 + 864s_m s_0^m n\beta b^4 + 384s_m s_0^m n\beta b^6 \\
& -768s_m^i s_i^m \beta^2 b^6 + 960s_0r_m^m \beta b^2 + 1344s_0r_m^m \beta b^4 + 512s_0r_m^m \beta b^6 + 960s_{0|m}b^m \beta b^2 \\
& +1344s_{0|m}b^m \beta b^4 + 512s_{0|m}b^m \beta b^6 - 480s_{m|0}b^m \beta b^2 - 672s_{m|0}b^m \beta b^4 - 256s_{m|0}b^m \beta b^6
\end{aligned}$$

$$\begin{aligned}
& -2016s_m s^m b^2 \beta^2 - 1152s_m s^m \beta^2 b^4 - 1440s_m^i s_i^m b^2 \beta^2 - 2016s_m^i s_i^m \beta^2 b^4 \\
d_{10} := & 8(1 + 2b^2)^2 (4s_m^i s_i^m \beta b^4 + 4s_{0|m}^m b^4 - 2s_m s_0^m n b^2 + 6s_m r_0^m b^2 - 4s_0 r_m^m b^2 + 8s_m s^m \beta b^2 \\
& - 2s_m s_0^m b^2 + 16s_m^i s_i^m \beta b^2 + 4r_m s_0^m b^2 + 2s_{m|0} b^m b^2 - 4s_{0|m} b^m b^2 + 4s_{0|m}^m b^2 + 16r s_0 b + 7s_m^i s_i^m \beta \\
& + 3s_m r_0^m + 2r_m s_0^m + s_{m|0} b^m - 4r s_0 - 2s_0 r_m^m - 2s_{0|m} b^m + 22s_m s^m \beta + 2s_m s_0^m + s_{0|m}^m - s_m s_0^m n) \\
d_{1\mathbb{F}} := & -4(1 + 2b^2)^3 (2s_m^i s_i^m b^2 + s_m^i s_i^m + 4s_m s^m)
\end{aligned}$$

### 8. APPENDIX 3: COEFFICIENTS IN (5)

$$\begin{aligned}
d'_0 := & 288(8n - 11)\beta^7 r_0^2, \\
d'_2 := & -24\beta^5 (108\overline{\text{Ric}}\beta^2 - 384r_{00}s_0 b\beta - 96r_{00}s_0 n\beta - 198r_{00|0} n\beta + 192r_{00}s_0 n b\beta + 192r_{00}r_0 n b\beta \\
& + 276r_{00|0}\beta + 120r_{00}s_0\beta - 384r_{00}r_0 b\beta + 96r_{00}r_0 n\beta + 192r_{00|0}\beta b^2 - 144r_{00}r_0\beta - 144r_{00|0} n\beta b^2 \\
& - 64r_{00}^2 n b^4 + 64r_{00}^2 b^4 + 512r_{00}^2 b^2 - 392r_{00}^2 n b^2 + 360r_{00}^2 - 273r_{00}^2 n) \\
d'_4 := & -2\beta^3 (-5360r_{00}r_0\beta - 1778r_{00|0} n\beta + 2112r_{00|0} b^4\beta + 256r_{00|0} b^6\beta - 2144r_{00}s_0\beta + 3936r_{00|0}\beta b^2 \\
& - 6912s_0^2\beta b^2 - 576rr_{00}\beta^2 - 2304r_0^2 b\beta^2 + 288r_{00}s_0\beta^2 - 1584r_{00}^2 n b^4 - 2712r_{00}^2 n b^2 \\
& + 1728r_{0m}r_0^m b^2\beta^2 - 3888r_{0m}s_0^m n\beta^2 + 2880r_{0m}s_0^m \beta^2 b^2 - 1944s_{0|0} n\beta^2 + 4032s_{0|0}\beta^2 b^2 \\
& - 2160r_{0m}r_m^m \beta^2 - 2160r_{0|m} b^m \beta^2 + 2160r_{0m|0} b^m \beta^2 - 1384r_{00}s_0 n\beta + 2304s_0^2 n\beta b^2 \\
& - 8416r_{00}s_0 b\beta + 4288r_{00}s_0\beta b^2 - 1024r_{00}s_0\beta b^5 - 6400r_{00}s_0\beta b^3 + 2768r_{00}r_0 n\beta \\
& - 8416r_{00}r_0 b\beta - 1024r_{00}s_0 n b^4\beta + 5536r_{00}s_0 n b\beta + 6400r_{00}s_0 n b^3\beta + 1024r_{00}s_0 n b^5\beta \\
& - 4288r_{00}s_0 n b^2\beta + 512r_{00}r_0 n b^4\beta + 5536r_{00}r_0 n b\beta + 6400r_{00}r_0 n b^3\beta + 1024r_{00}r_0 n b^5\beta \\
& + 3200r_{00}r_0 n b^2\beta + 2304r_{00}s_0 n b\beta^2 - 4352r_{00}r_0\beta b^2 - 512r_{00}r_0\beta b^4 - 1024r_{00}r_0\beta b^5 \\
& - 6400r_{00}r_0\beta b^3 - 4152r_{00|0} n\beta b^2 - 2400r_{00|0} n\beta b^4 - 256r_{00|0} n\beta b^6 + 1024r_{00}s_0 b^4\beta \\
& + 2304rr_{00}b\beta^2 + 1152r_{00}s_0 n\beta^2 - 8064r_{00}s_0 b\beta^2 - 3456r_{0m}s_0^m n\beta^2 b^2 + 1149r_{00}^2 \\
& + 1440r_{00}^2 b^4 + 4944r_{00}^2 b^2 - 753r_{00}^2 n + 2120r_{00|0}\beta + 144s_0^2\beta^2 + 576r_0^2\beta^2 + 2160r_{0m}r_0^m \beta^2 \\
& + 3168r_{0m}s_0^m \beta^2 + 4824s_{0|0}\beta^2 + 1296s_{0|m}^m \beta^3 + 4428(\text{Ric} - \overline{\text{Ric}})\beta^2 + 3456(\text{Ric} - \overline{\text{Ric}})\beta^2 b^4 \\
& + 8640(\text{Ric} - \overline{\text{Ric}})\beta^2 b^2 - 1728s_{0|0} n\beta^2 b^2 - 1728r_{00}r_m^m b^2\beta^2 - 1728r_{00|m} b^m b^2\beta^2 - 1728r_{0m|0} b^m b^2\beta^2) \\
d'_6 := & 2\beta(1128r_{00}r_0\beta + 153r_{00|0} n\beta - 96r_{00|0} b^4\beta + 1386r_{00}s_0\beta - 312r_{00|0}\beta b^2 - 1148s_0^2 n\beta^2 \\
& + 2976s_0^2\beta b^2 - 384s_0^2\beta^2 b^4 + 2048s_0^2 b^5\beta^2 + 6272s_0^2 b^3\beta^2 + 6368s_0^2 b\beta^2 + 1072rr_{00}\beta^2 \\
& - 1408r_0^2 b^2\beta^2 - 256r_0^2 b^4\beta^2 + 4288r_0^2 b\beta^2 + 5632r_0^2 b^3\beta^2 + 1024r_0^2 b^5\beta^2 + 2208r_{00}s_0\beta^2 \\
& + 180r_{00}^2 n b^4 + 156r_{00}^2 n b^2 - 3216r_{0m}r_0^m b^2\beta^2 - 2112r_{0m}r_0^m b^4\beta^2 - 256r_{0m}r_0^m b^6\beta^2 + 1728s_0 r_m^m \beta^3 b^2 \\
& + 1756r_{0m}s_0^m n\beta^2 - 1008r_{0m}s_0^m \beta^2 b^2 - 768r_{0m}s_0^m \beta^2 b^4 - 256r_{0m}s_0^m b^6\beta^2 + 878s_{0|0} n\beta^2 \\
& - 5328s_{0|0}\beta^2 b^2 - 3552s_{0|0}\beta^2 b^4 - 512s_{0|0} b^6\beta^2 + 576r s_0\beta^3 + 1512s_m s_0^m n\beta^3 - 3168s_m s_0^m \beta^3 b^2 \\
& - 2592s_m r_0^m \beta^3 b^2 - 1728r_m s_0^m \beta^3 b^2 + 1220r_{00}r_m^m \beta^2 + 1220r_{00|m} b^m \beta^2 - 1220r_{0m|0} b^m \beta^2 \\
& + 432s_m s_0^m \beta^2 + 1728s_0 r_m^m \beta^3 + 1728s_{0|m} b^m \beta^3 - 864s_{m|0} b^m \beta^3 - 6912s_{0|m}^m \beta^3 b^2 - 864s_{m|0} b^m \beta^3 b^2 \\
& - 3456s_{0|m}^m \beta^3 b^4 + 114r_{00}s_0 n\beta + 936r_{00}s_0 b\beta - 1200r_{00}s_0\beta b^2 - 1152r_{00}s_0\beta b^5 + 1728s_{0|m} b^m \beta^3 b^2 \\
& - 576r_{00}s_0\beta b^3 - 420r_{00}r_0 n\beta + 936r_{00}r_0 b\beta + 1248r_{00}s_0 n b^4\beta - 840r_{00}s_0 n b\beta - 2112r_{00}s_0 n b^3\beta \\
& - 1152r_{00}s_0 n b^5\beta + 1392r_{00}s_0 n b^2\beta - 576r_{00}r_0 n b^4\beta - 840r_{00}r_0 n b\beta - 2112r_{00}r_0 n b^3\beta \\
& - 1152r_{00}r_0 n b^5\beta - 1056r_{00}r_0 n b^2\beta - 3328r_{00}s_0 n b\beta^2 - 4864r_{00}s_0 n b^3\beta^2 - 1024r_{00}s_0 n b^5\beta^2 \\
& - 2432r_{00}s_0 n\beta^2 b^2 - 512r_{00}s_0 n\beta^2 b^4 + 1824r_{00}r_0\beta b^2 + 576r_{00}r_0\beta b^4 - 1152r_{00}r_0\beta b^5 + 864s_m s_0^m b^2\beta^2 \\
& - 576r_{00}r_0\beta b^3 + 630r_{00|0} n\beta b^2 + 792r_{00|0} n\beta b^4 + 288r_{00|0} n\beta b^6 - 384r_{00}s_0 b^4\beta - 3328s_0^2 n\beta b^2 \\
& - 4864s_0^2 n b^3\beta^2 - 1024s_0^2 n b^5\beta^2 - 1376s_0^2 n\beta^2 b^2 + 256s_0^2 n\beta^2 b^4 + 1408rr_{00}b^2\beta^2 - 256r_{0m|0} b^m b^6\beta^2)
\end{aligned}$$

$$\begin{aligned}
& +256rr_{00}b^4\beta^2 - 4288rr_{00}b\beta^2 - 5632rr_{00}b^3\beta^2 - 1024rr_{00}b^5\beta^2 + 1664r_0s_0n\beta^2 - 2112r_{0m|0}b^mb^4\beta^2 \\
& +2208r_0s_0\beta^2b^2 - 384r_0s_0\beta^2b^4 + 2560r_0s_0b^5\beta^2 + 11776r_0s_0b^3\beta^2 + 10144r_0s_0b\beta^2 \\
& +4992r_{0m}s_0^m n\beta^2b^2 + 3648r_{0m}s_0^m n\beta^2b^4 - 36r_{00}^2 - 264r_{00}^2b^4 - 492r_{00}^2b^2 - 3216r_{0m|0}b^mb^2\beta^2 \\
& +24r_{00}^2n - 159r_{00|0}\beta + 4932s_0^2\beta^2 - 1072r_0^2\beta^2 - 1220r_{0m}r_0^m\beta^2 - 776r_{0m}s_0^m\beta^2 + 256r_{00|m}b^mb^6\beta^2 \\
& -2218s_{0|0}\beta^2 - 2880s_m s_0^m\beta^3 - 2592s_m r_0^m\beta^3 - 1728r_m s_0^m\beta^3 - 2916s_{0|m}^m\beta^3 + 2112r_{00}r_m^m b^4\beta^2 \\
& -(\text{Ric} - \overline{\text{Ric}})\{1168\beta^2 + 6432\beta^2b^4 + 256\beta^2b^8 + 4880\beta^2b^2 + 2816\beta^2b^6\} + 256r_{00}r_m^m b^6\beta^2 \\
& +512r_{0m}s_0^m n\beta^2b^6 + 2496s_{0|0}n\beta^2b^2 + 1824s_{0|0}n\beta^2b^4 + 3216r_{00|m}b^mb^2\beta^2 - 324s_m^i s_i^m\beta^4 \\
& +256s_{0|0}n\beta^2b^6 - 2304rs_0b\beta^3 + 1728s_m s_0^m n\beta^3b^2 + 3216r_{00}r_m^m b^2\beta^2 + 2112r_{00|m}b^mb^4\beta^2)
\end{aligned}$$

$$\begin{aligned}
d'_8 := & -64r_{00}s_0b^4 - 112r_{00}s_0b^2 + 4r_{00}s_0n - 320r_{00}s_0b^5 - 128r_{00}s_0b^3 + 16r_{00}s_0b + 32r_{00}r_0b^4 \\
& +80r_{00}r_0b^2 - 8r_{00}r_0n - 320r_{00}r_0b^5 - 128r_{00}r_0b^3 + 16r_{00}r_0b + 12r_{00|0}nb^2 - 4352s_0^2\beta b^5 \\
& +24r_{00|0}nb^4 + 16r_{00|0}nb^6 - 256s_0^2n\beta + 3904s_0^2\beta b^2 + 5440s_0^2\beta b^4 + 512s_0^2b\beta - 2048s_0^2\beta b^3 \\
& +2816s_0^2\beta b^6 - 1024s_0^2\beta b^7 + 192rr_{00}\beta - 576r_0^2b^2\beta - 384r_0^2b^4\beta + 768r_0^2b\beta + 2304r_0^2b^3\beta \\
& +1536r_0^2b^5\beta + 672r_{00}s_0\beta - 576r_{0m}r_0^m b^2\beta - 864r_{0m}r_0^m b^4\beta - 384r_{0m}r_0^m b^6\beta + 384r_{0m}s_0^m\beta b^2 \\
& +1152r_{0m}s_0^m\beta b^4 + 136r_{0m}s_0^m n\beta + 640r_{0m}s_0^m\beta b^6 - 672s_{0|0}\beta b^2 - 720s_{0|0}\beta b^4 + 68s_{0|0}n\beta \\
& -256s_{0|0}\beta b^6 + 1184rs_0\beta^2 + 712s_m s_0^m n\beta^2 - 3504s_m s_0^m\beta^2b^2 - 3072s_m s_0^m\beta^2b^4 - 768s_m s_0^m\beta^2b^6 \\
& -5328s_m r_0^m\beta^2b^2 - 4608s_m r_0^m\beta^2b^4 - 768s_m r_0^m\beta^2b^6 - 3552r_m s_0^m\beta^2b^2 - 3072r_m s_0^m\beta^2b^4 \\
& -512r_m s_0^m\beta^2b^6 + 120r_{00}r_m^m\beta + 120r_{00|m}b^m\beta - 120r_{0m|0}b^m\beta + 96s_m s_0^m\beta + 1072s_{0r}r_m^m\beta^2 \\
& +1072s_{0|m}b^m\beta^2 - 536s_{m|0}b^m\beta^2 - 4288s_{0|m}^m\beta^2b^2 - 7104s_{0|m}^m\beta^2b^4 - 4096s_{0|m}^m\beta^2b^6 - 448r_0s_0nb\beta \\
& -512s_{0|m}^m\beta^2b^8 - 1296s_m s^m\beta^3 - 864s_m^i s_i^m\beta^3 + 112r_{00}s_0nb^4 - 16r_{00}s_0nb - 64r_{00}s_0nb^3 \\
& -64r_{00}s_0nb^5 + 64r_{00}s_0nb^2 - 32r_{00}r_0nb^4 - 16r_{00}r_0nb - 64r_{00}r_0nb^3 - 64r_{00}r_0nb^5 - 448s_0^2nb\beta \\
& -1408r_0s_0nb^3\beta - 1024r_0s_0nb^5\beta - 704r_0s_0nb\beta^2 - 512r_0s_0nb\beta^4 - 32r_{00}r_0nb^2 - 1408s_0^2nb^3\beta \\
& -1024s_0^2nb^5\beta - 1184s_0^2n\beta b^2 - 2912s_0^2n\beta b^4 - 2560s_0^2n\beta b^6 + 576rr_{00}b^2\beta + 384rr_{00}b^4\beta \\
& -768rr_{00}b\beta - 2304rr_{00}b^3\beta - 1536rr_{00}b^5\beta - 224r_0s_0n\beta + 2528r_0s_0\beta b^2 + 3584r_0s_0\beta b^4 \\
& +1280r_0s_0b\beta + 1280r_0s_0\beta b^3 - 256r_0s_0\beta b^5 + 1280r_0s_0\beta b^6 + 672r_{0m}s_0^m n\beta b^2 + 68r_{00}s_0 \\
& +1056r_{0m}s_0^m n\beta b^4 + 512r_{0m}s_0^m n\beta b^6 - 2r_{00|0} - 32r_{00}r_0 + 2r_{00|0}n + 24r_{00|0}b^4 + 32r_{00|0}b^6 \\
& +1808s_0^2\beta - 192r_0^2\beta - 120r_{0m}r_0^m\beta - 16r_{0m}s_0^m\beta - 188s_{0|0}\beta - 1296s_m s_0^m\beta^2 - 2592s_m^i s_i^m\beta^3b^2 \\
& -1608s_m r_0^m\beta^2 - 1072r_m s_0^m\beta^2 - 848s_{0|m}^m\beta^2 - 72(\text{Ric} - \overline{\text{Ric}})\beta - 1152(\text{Ric} - \overline{\text{Ric}})\beta b^4 \\
& -480(\text{Ric} - \overline{\text{Ric}})\beta b^2 - 1152(\text{Ric} - \overline{\text{Ric}})\beta b^6 + 336s_{0|0}n\beta b^2 + 528s_{0|0}n\beta b^4 + 256s_{0|0}nb^6\beta \\
& +2048rs_0b^2\beta^2 - 4736rs_0b\beta^2 - 8192rs_0b^3\beta^2 + 2544s_m s_0^m n\beta^2b^2 + 2496s_m s_0^m n\beta^2b^4 - 2048rs_0b^5\beta^2 \\
& +512s_m s_0^m nb^6\beta^2 + 512rs_0b^4\beta^2 + 576r_{00}r_m^m b^2\beta + 864r_{00}r_m^m b^4\beta + 384r_{00}r_m^m b^6\beta - 384(\text{Ric} - \overline{\text{Ric}})\beta b^8 \\
& +576r_{00|m}b^mb^2\beta + 864r_{00|m}b^mb^4\beta + 384r_{00|m}b^mb^6\beta - 576r_{0m|0}b^mb^2\beta - 864r_{0m|0}b^mb^4\beta \\
& -384r_{0m|0}b^mb^6\beta - 1728s_m^i s_i^m\beta^3b^4 + 576s_m s_0^m\beta b^2 + 1152s_m s_0^m\beta b^4 + 768s_m s_0^m\beta b^6 \\
& +3552s_{0r}r_m^m\beta^2b^2 + 3072s_{0r}r_m^m\beta^2b^4 + 512s_{0r}r_m^m\beta^2b^6 + 3552s_{0|m}b^mb^2\beta^2 + 3072s_{0|m}b^mb^4\beta^2 \\
& +512s_{0|m}b^mb^2b^6 - 1776s_{m|0}b^mb^2\beta^2 - 1536s_{m|0}b^mb^4\beta^2 - 256s_{m|0}b^mb^2b^6 - 1728s_m s^m\beta^3b^2
\end{aligned}$$

$$\begin{aligned}
d'_{10} := & -8(1 + 2b^2)^2(4s_m^i s_i^m\beta b^4 + 4s_{0|m}^m b^4 - 2s_m s_0^m nb^2 + 6s_m r_0^m b^2 - 4s_0 r_m^m b^2 + 8s_m s^m\beta b^2 \\
& -2s_m s_0^m b^2 + 16s_m^i s_i^m\beta b^2 + 4r_m s_0^m b^2 + 2s_{m|0}b^m b^2 - 4s_{0|m}b^m b^2 + 4s_{0|m}^m b^2 + 16rs_0b + 7s_m^i s_i^m\beta \\
& +3s_m r_0^m + 2r_m s_0^m + s_{m|0}b^m - 4rs_0 - 2s_0 r_m^m - 2s_{0|m}b^m + 22s_m s^m\beta + 2s_m s_0^m + s_{0|m}^m - s_m s_0^m n)
\end{aligned}$$

## 9. APPENDIX 4: COEFFICIENTS IN (7)

$$\begin{aligned}
d_0'' &:= -2592(\overline{\text{Ric}} - \text{Ric})\beta^7, \\
d_2'' &:= -2\beta^3(-576c^2\beta^4 - 144s_0^2\beta^2 + 4428(\overline{\text{Ric}} - \text{Ric})\beta^2 + 3456(\overline{\text{Ric}} - \text{Ric})\beta^2b^4 + 8640(\overline{\text{Ric}} - \text{Ric})\beta^2b^2 \\
&\quad + 1728s_{0|0}nb^2\beta^2 - 1152cs_0n\beta^3 + 576cs_0\beta^3 + 1944s_{0|0}n\beta^2 - 4032s_{0|0}b^2\beta^2 - 2160c_0\beta^3 - 1728c_0\beta^2b^3 \\
&\quad - 4824s_{0|0}\beta^2 - 1296s_{0|m}^m\beta^3) + 288\beta^7c^2(11 - 8n) - 24\beta^5(-192c_0\beta b^2 + 96cs_0n\beta + 144c_0n\beta b^2 \\
&\quad + 120cs_0\beta + 198c_0n\beta - 276c_0\beta - 96c^2b\beta^2 + 144c^2\beta^2) \\
d_4'' &:= 2\beta(1072c^2\beta^4 + 2592cs_0\beta^3 + 1728cs_0\beta^3 - 1476s_0^2\beta^2 - 1168(\overline{\text{Ric}} - \text{Ric})\beta^2 - 256(\overline{\text{Ric}} - \text{Ric})\beta^2b^8 \\
&\quad - 2816(\overline{\text{Ric}} - \text{Ric})\beta^2b^6 - 6432(\overline{\text{Ric}} - \text{Ric})\beta^2b^4 - 4880(\overline{\text{Ric}} - \text{Ric})\beta^2b^2 + 2432c\beta s_0n\beta^2b^2 \\
&\quad - 256s_{0|0}nb^6\beta^2 - 2496s_{0|0}nb^2\beta^2 - 1824s_{0|0}nb^4\beta^2 - 1728s_m s_0^m n\beta^3b^2 - 5536s_0^2n\beta^2b^2 - 256s_0^2n\beta^2b^4 \\
&\quad + 1664cs_0n\beta^3 - 2304cs_0\beta^3b^2 + 256c^2b^4\beta^4 - 2592cs_0\beta^3 + 3552s_{0|0}b^4\beta^2 + 512s_{0|0}\beta^2b^6 - 878s_{0|0}n\beta^2 \\
&\quad + 5328s_{0|0}b^2\beta^2 + 324s_m^i s_i^m \beta^4 + 1220c_0\beta^3 - 432s_m s_0^m \beta^2 - 1728s_0nc\beta^3 - 1728s_{0|m}^m b^m \beta^3 \\
&\quad + 864s_{m|0}b^m \beta^3 + 3456s_{0|m}^m \beta^3b^4 + 6912s_{0|m}^m b^2 \beta^3 - 576cb^2s_0\beta^3 - 1512s_m s_0^m n\beta^3 + 512cs_0n\beta^3b^4 \\
&\quad + 3168s_m s_0^m \beta^3b^2 + 2592cs_0\beta^3b^2 + 1728cs_0\beta^3b^2 - 2308s_0^2n\beta^2 + 3936s_0^2\beta^2b^2 + 384s_0^2\beta^2b^4 \\
&\quad + 1408c^2b^2\beta^4 + 3216c_0\beta^3b^2 + 2112c_0\beta^3b^4 + 256c_0b^6\beta^3 - 864s_m s_0^m b^2\beta^2 - 1728s_0nc\beta^3b^2 \\
&\quad - 1728s_{0|m}^m b^m \beta^3b^2 + 864s_{m|0}b^m \beta^3b^2 + 2218s_{0|0}\beta^2 + 2880s_m s_0^m \beta^3 + 2916s_{0|m}^m \beta^3) \\
&\quad - 2\beta^3(-2120c_0\beta - 2160c^2\beta^2 + 576c^2b^2\beta^2 + 1024cs_0n\beta b^4 - 3200c^2nb^2\beta^2 - 512c^2b\beta^2b^4 \\
&\quad + 4288cs_0nb^2\beta + 4152c_0n\beta b^2 + 2400c_0n\beta b^4 + 256c_0n\beta b^6 - 1024cs_0b^4\beta - 5248cs_0b^2\beta + 1384cs_0n\beta \\
&\quad + 4352c^2\beta^2b^2 + 512c^2\beta^2b^4 - 2768c^2b\beta^2 - 1728c^2b^2\beta^2 + 2160c^2n\beta^2 + 2160c_m b^m \beta^2 + 3824cs_0\beta \\
&\quad + 5360c^2\beta^2 + 1778c_0n\beta - 256c_0b^6\beta - 2112c_0b^4\beta - 3936c_0\beta b^2 + 1728c_m b^m \beta^2b^2 + 1728c^2n\beta^2b^2) \\
&\quad - 24\beta^5(-64c^2b^4 - 512c^2b^2 - 360c^2 + 392c^2nb^2 + 273c^2n + 64c^2nb^4) \\
d_6'' &:= -1040s_0^2\beta + 192c^2\beta^3 - 72(\overline{\text{Ric}} - \text{Ric})\beta + 480\text{Ric}\beta b^2 - 384(\overline{\text{Ric}} - \text{Ric})\beta b^8 - 1152(\overline{\text{Ric}} - \text{Ric})\beta b^6 \\
&\quad - 1152(\overline{\text{Ric}} - \text{Ric})\beta b^4 - 480\beta b^2 + 704cs_0n\beta^2b^2 + 512cs_0n\beta^2b^4 - 512s_m s_0^m nb^6\beta^2 - 256s_{0|0}nb^6\beta \\
&\quad - 336s_{0|0}nb^2\beta - 528s_{0|0}nb^4\beta - 2048cs_0b^4\beta^2 - 512cs_0b^6\beta^2 - 2544s_m s_0^m n\beta^2b^2 - 2496s_m s_0^m n\beta^2b^4 \\
&\quad - 3424s_0^2n\beta b^2 - 6304s_0^2n\beta b^4 - 3584s_0^2n\beta b^6 + 224cs_0n\beta^2 - 1760cs_0\beta^2b^2 - 1664cs_0\beta^2b^4 - 512cs_0\beta^2b^6 \\
&\quad + 384c^2b^4\beta^3 - 672cs_0\beta^2 + 672s_{0|0}b^2\beta + 256s_{0|0}\beta b^6 - 68s_{0|0}n\beta - 1072s_0nc\beta^2 + 120c_0\beta^2 - 96s_m s_0^m \beta \\
&\quad + 512s_{0|m}^m \beta^2b^8 + 7104s_{0|m}^m b^4\beta^2 + 4096s_{0|m}^m \beta^2b^6 + 4288s_{0|m}^m b^2\beta^2 + 1296s_m s_0^m \beta^3 \\
&\quad + 864s_m^i s_i^m \beta^3 - 1072s_{0|m}^m b^m \beta^2 + 536s_{m|0}b^m \beta^2 + 720s_{0|0}b^4\beta - 1184cb^2s_0\beta^2 - 712s_m s_0^m n\beta^2 \\
&\quad + 3504s_m s_0^m \beta^2b^2 + 3072s_m s_0^m \beta^2b^4 + 768s_m s_0^m b^6\beta^2 + 5328cs_0b^2\beta^2 + 4608cs_0\beta^2b^4 + 768cs_0\beta^2b^6 \\
&\quad + 3552cs_0b^2\beta^2 + 3072cs_0\beta^2b^4 + 512cs_0\beta^2b^6 - 512s_0^2n\beta + 704s_0^2\beta b^2 + 3776s_0^2\beta b^4 + 3328s_0^2\beta b^6 \\
&\quad + 576c^2b^2\beta^3 + 576c_0\beta^2b^2 + 864c_0\beta^2b^4 + 384c_0b^6\beta^2 - 576s_m s_0^m \beta b^2 - 1152s_m s_0^m \beta b^4 - 768s_m s_0^m \beta b^6 \\
&\quad - 3552s_0ncb^2\beta^2 - 3072s_0nc\beta^2b^4 - 512s_0nc\beta^2b^6 - 3552s_{0|m}^m b^m \beta^2\beta^2 - 3072s_{0|m}^m b^m \beta^2b^4 \\
&\quad - 512s_{0|m}^m b^m \beta^2b^6 + 1776s_{m|0}b^m \beta^2\beta^2 + 1536s_{m|0}b^m \beta^2b^4 + 256s_{m|0}b^m \beta^2b^6 + 1728s_m s_0^m \beta^3b^2 \\
&\quad + 2592s_m^i s_i^m \beta^3b^2 + 1728s_m^i s_i^m \beta^3b^4 - 57 + 188s_{0|0}\beta + 1296s_m s_0^m \beta^2 + 848s_{0|m}^m \beta^2 \\
&\quad - 1248cs_0n\beta b^4 + 1056c^2nb^2\beta^2 + 1608cs_0\beta^2 + 1072cs_0\beta^2 + 2\beta(159c_0\beta + 1220c^2\beta^2 - 1072c^2b^2\beta^2 \\
&\quad + 576c^2b\beta^2b^4 - 1392cs_0nb^2\beta - 630c_0n\beta b^2 - 792c_0n\beta b^4 - 288c_0n\beta b^6 + 2304cs_0b^4\beta + 2880cs_0b^2\beta \\
&\quad - 114cs_0n\beta - 1824c^2\beta^2b^2 - 576c^2\beta^2b^4 + 420c^2b\beta^2 - 1408c^2b^4\beta^2 - 256c^2b^6\beta^2 + 3216c^2b^2\beta^2 \\
&\quad + 2112c^2b^4\beta^2 + 256c^2b^6\beta^2 - 1220c^2n\beta^2 - 1220c_m b^m \beta^2 - 1386cs_0\beta - 1128c^2\beta^2 - 153c_0n\beta \\
&\quad + 96c_0b^4\beta + 312c_0\beta b^2 - 3216c_m b^m \beta^2b^2 - 2112c_m b^m \beta^2b^4 - 256c^2nb^6\beta^2 - 256c_m b^m \beta^6\beta^2 - 3216c^2n\beta^2b^2 \\
&\quad - 2112c^2n\beta^2b^4) - 2\beta^3(-1440c^2b^4 - 4944c^2b^2 + 753c^2n - 1149c^2 + 1584c^2nb^4 + 2712c^2nb^2) \\
d_8'' &:= 8(1 + 2b^2)^2(4s_m^i s_i^m \beta b^4 + 4s_{0|m}^m b^4 + 16s_m^i s_i^m \beta b^2 + 4s_{0|m}^m b^2 - 4s_0ncb^2 + 2s_{m|0}b^m b^2)
\end{aligned}$$

$$\begin{aligned}
& -2s_m s_0^m n b^2 - 4s_{0|m}^m b^m b^2 - 2s_m s_0^m b^2 + 6cs_0 b^2 + 4cs_0 b^2 + 8s_m s^m \beta b^2 + s_{0|m}^m + 2s_m s_0^m \\
& + 3cs_0 + 2cs_0 - 2s_{0|m}^m b^m + s_{m|0} b^m - 4cb^2 s_0 - 2s_0 nc + 7s_m^i s_i^m \beta + 22s_m s^m \beta - s_m s_0^m n) \\
& + 120c^2 \beta - 120c_m b^m \beta + 64cs_0 b^4 + 112cs_0 b^2 - 4cs_0 n - 12c_0 n b^2 - 24c_0 n b^4 - 16c_0 n b^6 - 68cs_0 \\
& - 32c^2 \beta - 2c_0 n - 32c_0 b^6 - 24c_0 b^4 - 112cs_0 n b^4 - 64cs_0 n b^2 + 32c^2 \beta n b^4 + 32c^2 \beta n b^2 - 576c^2 b^4 \beta \\
& - 384c^2 b^6 \beta + 576c^2 b^2 \beta + 864c^2 b^4 \beta + 384c^2 b^6 \beta - 32c^2 \beta b^4 - 80c^2 \beta b^2 + 8c^2 \beta n - 576c_m b^m \beta b^2 \\
& - 864c_m b^m \beta b^4 - 384c^2 n b^6 \beta - 384c_m b^m b^6 \beta - 192c^2 b^2 \beta - 6c^2 n \beta b^2 - 864c^2 n \beta b^4 \\
& + 2c_0 - 120c^2 n \beta + 2\beta(264c^2 b^4 + 492c^2 b^2 - 24c^2 n + 36c^2 - 180c^2 n b^4 - 156c^2 n b^2)
\end{aligned}$$

## 10. APPENDIX 5: COEFFICIENTS IN (9)

$$\begin{aligned}
t'_0 & := -288[10y^i y_j c^2 \beta^2 + (12y^i y_j cs_0 \beta + 17y^i y_j c_0 \beta + 16y^i y_j c_0 b^2 \beta - 16y^i y_j c^2 \beta^2 + 4y^i y_j c^2 \beta^2) \\
& + (32y^i y_j s_0^2 b - 20y^i y_j cs_0 \beta - 8y^i y_j s_{0|0} b^2 - 6y^i y_j s_0^2 - 10y^i y_j s_{0|0} - 4y^i cy_j s_0 \beta - 8y^i cy_j c^2 \beta^2 \\
& - 24y^i c_0 y_j b^2 \beta - 24s_{0|0}^i y_j b^2 \beta + 9(R_j^i - \bar{R}_j^i) \beta^2 - 2979s_0^i s_{0j} \beta^2 - 33y^i c_0 y_j \beta - 60s_{0|0}^i y_j \beta \\
& + 32y^i y_j cs_0 b \beta + 32y^i cy_j s_0 b \beta + 32y^i c^2 y_j b \beta^2)] \beta^5 \\
t'_2 & := [-48\beta^5 (-48\delta_j^i c^2 \beta^2 + 18b^i y_j c^2 \beta - 36y^i b_j c^2 \beta + 131y^i y_j c^2 + 64y^i y_j c^2 b^4 + 222y^i y_j c^2 b^2) \\
& - 4\beta^3 (1152\delta_j^i cs_0 b \beta^3 + 1152\delta_j^i c^2 b \beta^4 + 1270y^i y_j cs_0 \beta - 1964y^i y_j c^2 \beta^2 + 2700y^i y_j c_0 b^2 \beta \\
& + 1920y^i y_j c_0 b^4 \beta - 720y^i b_j cs_0 \beta^2 + 288y^i b_j c^2 \beta^3 - 288y^i b_j c_0 b^2 \beta^2 - 864y^i s_j cb^2 \beta^2 + 956y^i y_j c_0 \beta \\
& + 468b^i y_j c_0 \beta^2 - 36y^i b_j c_0 \beta^2 + 576y^i b_j c^2 \beta^3 + 720y^i s_j c \beta^3 - 576\delta_j^i cs_0 \beta^3 + 960y^i c^2 y_j \beta^2 \\
& + 1728y^i c_j b^2 \beta^3 - 144b^i c^2 y_j \beta^3 - 1404y^i s_j c \beta^2 - 2672y^i y_j c^2 b^2 \beta^2 - 3328y^i y_j cs_0 b^3 \beta + 2368y^i y_j cs_0 b^2 \beta \\
& - 976y^i y_j cs_0 b \beta - 976y^i y_j c^2 b \beta^2 - 3328y^i y_j c^2 b^3 \beta^2 - 1024y^i y_j cs_0 b^5 \beta + 1024y^i y_j cs_0 b^4 \beta + 576\delta_j^i c^2 \beta^4 \\
& - 864\delta_j^i c_0 b^2 \beta^3 + 2376y^i c_j \beta^3 - 1188\delta_j^i c_0 \beta^3 - 144b^i y_j c^2 \beta^3 + 288b^i y_j c_0 b^2 \beta^2 + 256y^i y_j c_0 b^6 \beta \\
& - 2304y^i cb_j cb \beta^3 + 144b^i y_j cs_0 \beta^2 - 1024y^i y_j c^2 b^5 \beta^2 - 512y^i y_j c^2 b^4 \beta^2 - 1152b^i y_j cs_0 b \beta^2 - 1152b^i y_j c^2 b \beta^3 \\
& - 1152y^i b_j cs_0 b \beta^2 - 1152y^i b_j c^2 b \beta^3 + 336y^i cy_j cb^2 \beta^2 - 2304y^i s_j cb \beta^3 + 288c^2 y^i y_j b^2 \beta^2 + 468c^2 y^i y_j \beta^2 \\
& + 486\beta^2 s_0^i y_j c) + \beta(9216y^i cb_j s_0 b \beta^4 + 2976y^i y_j s_0^2 b^2 \beta^2 - 7104y^i y_j s_0^2 b \beta^2 - 6144y^i y_j s_0^2 b^3 \beta^2 \\
& + 7152y^i y_j cs_0 \beta^3 - 1152y^i y_j s_m s_0^m b^2 \beta^3 + 1104y^i y_j s_{0|0} b^2 \beta^2 + 384y^i y_j s_{0|0} b^4 \beta^2 - 4608b^i y_j s_{0|0} b^2 \beta^3 \\
& + 9216y^i b_j s_0^2 b \beta^3 - 2304y^i b_j cs_0 \beta^4 - 2304y^i b_j s_{0|0} b^2 \beta^3 + 3456y^i s_j s_0 b^2 \beta^3 + 1296s_k^i s_0^k y_j \beta^4 + 1992y^i y_j s_0^2 \beta^2 \\
& - 576y^i y_j s_m s_0^m \beta^3 + 564y^i y_j s_{0|0} \beta^2 - 4464b^i y_j s_{0|0} \beta^3 - 864b^i y_j s_0^2 \beta^3 - 2880y^i b_j s_{0|0} \beta^3 - 2304y^i cb_j s_0 \beta^4 \\
& - 1728y^i s_j s_0 \beta^4 + 1152y^i s_j c \beta^5 - 4608\delta_j^i s_0^2 b \beta^4 - 2304\delta_j^i cs_0 \beta^5 + 3456\delta_j^i s_{0|0} b^2 \beta^4 + 3040y^i cy_j s_0 \beta^3 \\
& + 5536y^i c^2 y_j \beta^4 + 16608y^i c_0 y_j b^2 \beta^3 + 9600y^i c_0 y_j \beta^3 b^4 + 1024y^i c_0 y_j b^6 \beta^3 - 3456y^i cs_0 j b^2 \beta^4 \\
& + 6912y^i cs_0 j b^2 \beta^4 + 3456y^i s_{j|0} b^2 \beta^4 + 23040s_{0|0}^i y_j b^2 \beta^3 + 18432s_{0|0}^i y_j \beta^3 b^4 + 3072s_{0|0}^i y_j b^6 \beta^3 \\
& - 6912y^i s_{0j} b^2 \beta^4 - 576b^i cy_j s_0 \beta^4 - 1152b^i c^2 y_j \beta^5 - 3456b^i c_0 y_j b^2 \beta^4 + 5616y^i s_j s_0 \beta^3 - 4608\delta_j^i cs_0 b \beta^5 \\
& - 8856(R_j^i - \bar{R}_j^i) \beta^4 + 2931336s_0^i s_{0j} \beta^4 + 1296s_{j|0}^i \beta^5 - 2592s_{j|0}^i \beta^5 + 12096y^i y_j cs_0 b^2 \beta^3 \\
& - 7104y^i y_j cs_0 b \beta^3 - 6144y^i y_j cs_0 b^3 \beta^3 + 5719680s_0^i s_{0j} b^2 \beta^4 + 2287872s_0^i s_{0j} \beta^4 b^4 - 4320cy^i cy_j \beta^4 \\
& - 7776y^i s_{0j} \beta^4 - 4320b^i c_0 y_j \beta^4 - 1296s_{0|0}^i b_j \beta^4 + 3888\delta_j^i s_{0|0} \beta^4 + 7112y^i c_0 y_j \beta^3 - 3888y^i cs_0 j \beta^4 \\
& + 7776y^i cs_0 j \beta^4 + 3888y^i s_{j|0} \beta^4 + 7620s_{0|0}^i y_j \beta^3 - 576b^i y_j cs_0 \beta^4 + 9216b^i y_j s_0^2 b \beta^3 + 3072y^i y_j cs_0 b^4 \beta^3 \\
& + 9216b^i y_j cs_0 b \beta^4 + 9216y^i b_j cs_0 b \beta^4 - 22144y^i cy_j s_0 b \beta^3 - 22144y^i c^2 y_j b \beta^4 + 5440y^i cy_j s_0 b^2 \beta^3 \\
& - 25600y^i cy_j s_0 b^3 \beta^3 + 6400y^i c^2 y_j b^2 \beta^4 - 25600y^i c^2 y_j b^3 \beta^4 + 1024y^i cy_j s_0 \beta^3 b^4 - 4096y^i cy_j s_0 b^5 \beta^3 \\
& + 1024y^i c^2 y_j b^4 \beta^4 - 4096y^i c^2 y_j b^5 \beta^4 + 4608b^i cy_j s_0 b \beta^4 + 4608b^i c^2 y_j b \beta^5 + 4608y^i s_j s_0 b \beta^4 \\
& - 4608y^i s_j cb \beta^5 - 4608cy^i y_j s_0 b^2 \beta^3 - 3456c^2 y^i y_j b^2 \beta^4 - 4464cy^i y_j s_0 \beta^3 - 1944\beta^3 s_0^i y_j s_0 \\
& - 6912(R_j^i - \bar{R}_j^i) \beta^4 b^4 - 17280(R_j^i - \bar{R}_j^i) \beta^4 b^2)]
\end{aligned}$$

$$\begin{aligned}
t_4 := & [-4\beta^3(-384y^i b_j c^2 b^4 \beta - 648y^i b_j c^2 b^2 \beta + 54b^i y_j c^2 \beta - 72b^i b_j c^2 \beta^2 - 894y^i b_j c^2 \beta - 384\delta_j^i c^2 b^4 \beta^2 \\
& - 2352\delta_j^i c^2 b^2 \beta^2 - 1638\delta_j^i c^2 \beta^2 + 504b^i y_j c^2 b^2 \beta + 207y^i y_j c^2 + 1128y^i y_j c^2 b^4 + 1050y^i y_j c^2 b^2) \\
& + \beta(-4536\beta^2 s_0^i y_j c b^2 - 2592\beta^2 s_0^i y_j c b^4 + 8576\delta_j^i c s_0 b^2 \beta^3 - 11072\delta_j^i c s_0 b \beta^3 - 12800\delta_j^i c s_0 b^3 \beta^3 \\
& - 6400\delta_j^i c^2 b^2 \beta^4 - 11072\delta_j^i c^2 b \beta^4 + 24y^i y_j c s_0 \beta + 1068y^i y_j c^2 \beta^2 - 1524y^i y_j c_0 b^2 \beta - 2208y^i y_j c_0 b^4 \beta \\
& + 4096y^i c^2 b_j b^5 \beta^3 + 25600y^i c b_j b^3 \beta^3 - 288b^i b_j c^2 s_0 \beta^3 - 576b^i b_j c^2 \beta^4 + 1152b^i b_j c_0 b^2 \beta^3 + 512y^i b_j c_0 b^6 \beta^2 \\
& + 6056y^i b_j c s_0 \beta^2 - 2320y^i b_j c^2 \beta^3 + 2496y^i b_j c_0 b^2 \beta^2 + 2880y^i b_j c_0 b^4 \beta^2 + 2160y^i s_j c b^2 \beta^2 + 2880g^i y_j c \beta^3 b^2 \\
& - 1728b^i s_j c \beta^3 b^2 - 4608b^i c^2 b_j b^4 - 330y^i y_j c_0 \beta - 684b^i y_j c_0 \beta^2 + 1872b^i b_j c_0 \beta^3 + 268y^i b_j c_0 \beta^2 \\
& + 3456\delta_j^i c b^2 \beta^4 + 1152b^i c^2 b_j \beta^4 - 5536y^i b_j c^2 \beta^3 + 1944s_0^i b_j c \beta^3 + 512\delta_j^i c_0 b^6 \beta^3 + 2768\delta_j^i c s_0 \beta^3 \\
& + 720b^i y_j c^2 \beta^3 - 1440b^i y_j c_0 b^2 \beta^2 - 576b^i y_j c_0 b^4 \beta^2 - 960y^i y_j c_0 b^6 \beta + 22144y^i b_j c^2 b \beta^3 - 6400y^i b_j c^2 \beta^3 b^2 \\
& - 1024y^i c b_j c \beta^3 b^4 + 1440b^i s_j c \beta^4 - 6784y^i s_j c \beta^3 - 16608y^i c_j b^2 \beta^3 - 9600y^i c_j \beta^3 b^4 - 1024y^i c_j b^6 \beta^3 \\
& + 3456b^i c_j b^2 \beta^4 - 840y^i y_j c^2 \beta^2 + 2592b^i y_j c^2 \beta^3 + 3024y^i y_j c^2 b^2 \beta^2 + 4608y^i y_j c s_0 b^3 \beta - 1584y^i y_j c s_0 b^2 \beta \\
& + 1200y^i y_j c s_0 b \beta + 1200y^i y_j c^2 b \beta^2 + 4608y^i y_j c^2 b^3 \beta^2 + 2052y^i s_j c \beta^2 + 2304g^i y_j c \beta^3 - 12800\delta_j^i c^2 b^3 \beta^4 \\
& + 2048\delta_j^i c s_0 b^4 \beta^3 - 2048\delta_j^i c^2 b^5 \beta^4 - 2048\delta_j^i c s_0 b^5 \beta^3 - 1620\beta^2 s_0^i y_j c + 3840y^i y_j c s_0 b^5 \beta \\
& - 3264y^i y_j c s_0 b^4 \beta - 5536\delta_j^i c^2 \beta^4 + 8304\delta_j^i c_0 b^2 \beta^3 + 4800\delta_j^i c_0 b^4 \beta^3 + 3556\delta_j^i c_0 \beta^3 - 3456b^i s_j c \beta^3 \\
& + 4320b^i c_j \beta^4 - 7112y^i c_j \beta^3 + 1872c y^i b_j c \beta^3 - 1440c y^i y_j c b^2 \beta^2 - 576c y^i y_j c \beta^2 b^4 + 3816b^i y_j c s_0 \beta^2 \\
& + 3840y^i y_j c^2 b^5 \beta^2 + 1920y^i y_j c^2 b^4 \beta^2 + 288b^i y_j c s_0 b^2 \beta^2 + 5760b^i y_j c s_0 b \beta^2 + 4608b^i y_j c s_0 b^3 \beta^2 \\
& + 576b^i y_j c^2 b^2 \beta^3 + 5760b^i y_j c^2 b \beta^3 + 4608b^i y_j c^2 b^3 \beta^3 - 4608b^i b_j c s_0 b \beta^3 - 4608b^i b_j c^2 b \beta^4 \\
& + 2336y^i b_j c s_0 b^2 \beta^2 + 7168y^i b_j c s_0 b \beta^2 - 512y^i b_j c s_0 b^3 \beta^2 - 4288y^i b_j c^2 b^2 \beta^3 + 7168y^i b_j c^2 b \beta^3 \\
& - 512y^i b_j c^2 b^3 \beta^3 + 4320\delta_j^i c \beta^4 - 2048y^i b_j c s_0 b^5 \beta^2 + 2048y^i b_j c s_0 b^4 \beta^2 - 2048y^i b_j c^2 b^5 \beta^3 \\
& - 1024y^i b_j c^2 b^4 \beta^3 - 1024\delta_j^i c^2 b^4 \beta^4 + 288y^i c^2 y_j b^2 \beta^2 + 768y^i y_j c^2 \beta^2 b^4 + 1152b^i y_j c^2 \beta^3 b^2 \\
& - 4608b^i s_j c b \beta^4 + 22144y^i s_j c b \beta^3 - 6880y^i s_j c \beta^3 b^2 - 1024y^i s_j c \beta^3 b^4 + 25600y^i s_j c b^3 \beta^3 + 4096y^i s_j c b^5 \beta^3 \\
& + 1152c^2 y^i b_j \beta^3 b^2 - 684c^2 y^i y_j \beta^2) - (648s_k^i s_j^k \beta^5 - 773216s_0^i s_0 j \beta^3 - 2916s_{j|0} \beta^4 + 5832s_{j|0}^i \beta^4 \\
& + 2720y^i s_j s_0 b^2 \beta^3 + 512y^i s_j s_0 \beta^3 b^4 + 2384y^i s_j s_0 \beta^3 - 1864192s_0^i s_0 j b^6 \beta^3 - 169472s_0^i s_0 j \beta^3 b^8 \\
& + 2440c y^i c y_j \beta^3 - 3456b^i s_{0j} \beta^4 - 3456\delta_j^i s_0 \beta^4 - 3024\delta_j^i s_m s_0^m \beta^4 + 1756y^i c s_{0j} \beta^3 \\
& + 1728s_{0|0}^i b_j \beta^3 - 1728b^i c s_{0j} \beta^4 + 1000\delta_j^i s_0^2 \beta^3 - 3512y^i c s_{j0} \beta^3 - 1756y^i s_{j|0} \beta^3 - 664s_{0|0}^i y_j \beta^2 \\
& - 1756\delta_j^i s_{0|0} \beta^3 + 3512y^i s_{0j} \beta^3 + 1728b^i s_{j|0} \beta^4 + 1512y^i s_m s_0^m \beta^4 - 612y^i c_0 y_j \beta^2 + 6912s_{j|0}^i \beta^4 b^4 \\
& + 2440b^i c_0 y_j \beta^3 - 6912s_{j|0}^i b^2 \beta^4 - 3456s_{j|0}^i \beta^4 b^4 + 3456b^i c s_{j0} \beta^4 + 13824s_{j|0}^i b^2 \beta^4 + 1728g^i c y_j \beta^4 \\
& - 3648y^i s_{j|0} \beta^3 b^4 - 512y^i s_{j|0} b^6 \beta^3 - 3680s_{0|0}^i y_j b^2 \beta^2 + 3456b^i s_j s_0 \beta^3 - 1476y^i s_j s_0 \beta^2 + 1024y^i s_{0j} b^6 \beta^3 \\
& + 368b^i c y_j s_0 \beta^3 + 564y^i b_j s_{0|0} \beta^2 - 236y^i y_j s_0^2 \beta + 316y^i y_j s_m s_0^m \beta^2 - 4y^i y_j s_{0|0} \beta - 7008s_{0|0}^i y_j \beta^2 b^4 \\
& - 5120s_{0|0}^i y_j \beta^2 b^6 - 1024s_{0|0}^i y_j \beta^2 b^8 + 1728b^i s_{j|0} b^2 \beta^4 + 5184s_{0|0}^i b_j b^2 \beta^3 + 3456s_{0|0}^i b_j \beta^3 b^4 \\
& - 1024y^i c s_{j0} b^6 \beta^3 + 2144b^i y_j c^2 \beta^4 - 2736b^i b_j s_{0|0} \beta^3 + 9984y^i s_{0j} b^2 \beta^3 + 7296y^i s_{0j} \beta^3 b^4 \\
& - 576y^i c y_j s_0 \beta^2 - 840y^i y_j c^2 \beta^3 - 1152b^i c b_j s_0 \beta^4 + 3328y^i c b_j s_0 \beta^3 + 936y^i b_j s_m s_0^m \beta^3 + 6432b^i c_0 y_j b^2 \beta^3 \\
& + 4224b^i c_0 y_j \beta^3 b^4 + 512b^i c_0 y_j b^6 \beta^3 - 576g^i y_j s_0 \beta^3 - 2520y^i c_0 y_j b^2 \beta^2 - 3168y^i c_0 y_j \beta^2 b^4 - 1152y^i c_0 y_j \beta^2 b^6 \\
& + 4992y^i c s_{0j} b^2 \beta^3 + 3648y^i c s_{0j} \beta^3 b^4 + 512y^i c s_{0j} b^6 \beta^3 - 9984y^i c s_{j0} b^2 \beta^3 - 7296y^i c s_{j0} \beta^3 b^4 \\
& + 1728y^i s_m s_0^m b^2 \beta^4 - 512\delta_j^i s_0^2 b^4 \beta^3 + 2048\delta_j^i s_0^2 b^5 \beta^3 - 512\delta_j^i s_{0|0} b^6 \beta^3 - 3456\delta_j^i s_m s_0^m b^2 \beta^4 \\
& - 704\delta_j^i s_0^2 b^2 \beta^3 + 6656\delta_j^i s_0^2 b \beta^3 + 9728\delta_j^i s_0^2 b^3 \beta^3 + 3328\delta_j^i c \beta s_0 \beta^3 - 3456b^i s_{0j} b^2 \beta^4 + 3456b^i c s_{j0} b^2 \beta^4 \\
& - 1664y^i s_j c \beta^4 - 3456\delta_j^i s_0 b^2 \beta^4 - 1336b^i y_j s_0^2 \beta^2 + 2088b^i y_j s_m s_0^m \beta^3 + 952b^i y_j s_{0|0} \beta^2 - 1392y^i b_j s_0^2 \beta^2 \\
& + 1728g^i c y_j b^2 \beta^4 - 1728b^i c s_{0j} b^2 \beta^4 - 4992y^i s_{j0} b^2 \beta^3 - 1328y^i y_j c s_0 b^2 \beta^2 + 128y^i y_j c s_0 b \beta^2 \\
& + 128y^i y_j c s_0 b^3 \beta^2 - 256y^i y_j c s_0 b^5 \beta^2 - 1088y^i y_j c s_0 b^4 \beta^2 + 1536y^i b_j c s_0 b^4 \beta^3 + 6912b^i b_j c \beta s_0 b \beta^3 \\
& + 4800y^i b_j c s_0 b^2 \beta^3 - 7104y^i b_j c s_0 b \beta^3 - 6144y^i b_j c s_0 b^3 \beta^3 - 2048b^i y_j c s_0 b^5 \beta^3 + 512b^i y_j c s_0 b^4 \beta^3 \\
& + - 9728b^i y_j c s_0 b^3 \beta^3 + 1280b^i y_j c s_0 b^2 \beta^3 - 6080b^i y_j c s_0 b \beta^3 - 3456s_k^i s_0^k y_j \beta^3 b^4 - 1944s_0^i b_j s_0 \beta^3
\end{aligned}$$



$$\begin{aligned}
& -4320s_k^i s_0^k y_j b^2 \beta^3 + 2592\beta^2 s_0^i y_j s_0 b^4 - 864b^i s_j s_0 \beta^4 + 3216cy^i y_j s_0 b^2 \beta^2 + 2880cy^i y_j s_0 \beta^2 b^4 \\
& + 512cy^i y_j s_0 b^6 \beta^2 - 2880cy^i b_j s_0 b^2 \beta^3 + 2592\beta^2 s_0^i y_j s_0 b^2 - 2880y^i s_j s_0 b^2 \beta^2 + 1728b^i s_j s_0 b^2 \beta^3 \\
& + 512b^i cy_j s_0 \beta^3 b^4 - 2048b^i cy_j s_0 b^5 \beta^3 + 576y^i b_j s_m s_0^m b^2 \beta^3 + 4864\delta_j^i cs_0 b^2 \beta^4 + 6656\delta_j^i cs_0 b \beta^4 \\
& + 9728\delta_j^i cs_0 b^3 \beta^4 + 2048\delta_j^i cs_0 b^5 \beta^4 + 48y^i y_j s_{0|0} b^4 \beta + 512b^i y_j s_{0|0} \beta^2 b^6 - 13312y^i cb_j s_0 b \beta^3 \\
& - 256b^i y_j s_0^2 b^2 \beta^2 - 6080b^i y_j s_0^2 b \beta^2 - 9728b^i y_j s_0^2 b^3 \beta^2 + 3216b^i y_j s_{0|0} b^2 \beta^2 + 2880b^i y_j s_{0|0} b^4 \beta^2 \\
& + 512b^i cy_j c \beta b^4 \beta^3 - 2048b^i cy_j cb^5 \beta^4 + 4864y^i cb_j s_0 b^2 \beta^3 + 960y^i b_j s_0^2 b^2 \beta^2 - 7104y^i b_j s_0^2 b \beta^2 \\
& + 2048y^i s_j cb^5 \beta^4 + 64y^i y_j s_{0|0} \beta b^6 + 1104y^i b_j s_{0|0} b^2 \beta^2 + 384y^i b_j s_{0|0} b^4 \beta^2 - 2048y^i s_j s_0 b^5 \beta^3 \\
& - 512y^i s_j cb^4 \beta^4 - 11264b^i y_j c^2 b^3 \beta^4 + 1464y^i y_j s_m s_0^m b^2 \beta^2 + 1920y^i y_j s_m s_0^m b^4 \beta^2 - 256y^i y_j s_0^2 b^5 \beta \\
& - 32y^i y_j s_0^2 b^4 \beta - 8576b^i cy_j s_0 b \beta^3 - 1728y^i cy_j s_0 \beta^2 b^4 + 4608y^i cy_j s_0 b^5 \beta^2 - 1152y^i y_j c^2 b^4 \beta^3 \\
& + 4608y^i y_j c^2 b^5 \beta^3 - 488y^i y_j s_0^2 b^2 \beta + 128y^i y_j s_0^2 b \beta + 128y^i y_j s_0^2 b^3 \beta - 392y^i y_j cs_0 \beta^2 - 8576b^i y_j c^2 b \beta^4 \\
& + 1856b^i cy_j s_0 b^2 \beta^3 - 11264b^i cy_j s_0 b^3 \beta^3 + 2816b^i y_j c^2 b^4 \beta^4 + 512y^i y_j s_m s_0^m b^6 \beta^2 + 8448y^i cy_j s_0 b^3 \beta^2 \\
& + 8448y^i y_j c^2 b^3 \beta^3 - 19456y^i cb_j s_0 b^3 \beta^3 + 1024y^i cb_j s_0 \beta^3 b^4 - 4096y^i cb_j s_0 b^5 \beta^3 - 2880b^i b_j s_{0|0} b^2 \beta^3 \\
& - 6656y^i s_j s_0 b \beta^3 + 6656y^i s_j cb \beta^4 - 9728y^i s_j s_0 b^3 \beta^3 - 2432y^i s_j cb^2 \beta^4 + 9728y^i s_j cb^3 \beta^4 - 6144y^i b_j s_0^2 b^3 \beta^3 \\
& + 2160y^i b_j cs_0 \beta^3 + 512b^i y_j cs_0 \beta^3 + 2880b^i y_j s_m s_0^m b^2 \beta^3 - 1152y^i y_j s_0 b^2 \beta^3 + 6912b^i b_j s_0^2 b \beta^3 \\
& + 2304b^i s_j s_0 b \beta^4 - 2304b^i s_j cb \beta^5 - 2112y^i y_j c^2 \beta^3 b^2 + 1024\delta_j^i cs_0 b^4 \beta^4 + 3360y^i cy_j s_0 b \beta^2 + 3360y^i cy_j c \beta b \beta^2 \\
& - 2448y^i cy_j s_0 b^2 \beta^2 - 2048b^i y_j s_0^2 b^5 \beta^2 + 512b^i y_j s_0^2 b^4 \beta^2 + 4608b^i cb_j s_0 b \beta^4 + 1728cy^i s_j b^2 \beta^4 \\
& + 952cy^i y_j s_0 \beta^2 - 2736cy^i b_j s_0 \beta^3 + 648\beta^2 s_0^i y_j s_0 + 6432c^2 y^i y_j b^2 \beta^3 + 4224c^2 y^i y_j \beta^3 b^4 + 512c^2 y^i y_j b^6 \beta^3 \\
& - 1152y^i s_j s_0 \beta^2 b^4 - 1296s_k^i s_0^k y_j \beta^3 + 1728cy^i s_j \beta^4 + 648s_k^i s_0^k b_j \beta^4 - 3230560s_0^i s_{0|0} b^2 \beta^3 \\
& - 4257984s_0^i s_{0|0} \beta^3 b^4 + 2336(R_j^i - \bar{R}_j^i) \beta^3 + 9760(R_j^i - \bar{R}_j^i) \beta^3 b^2 + 12864(R_j^i - \bar{R}_j^i) \beta^3 b^4 \\
& + 5632(R_j^i - \bar{R}_j^i) \beta^3 b^6 + 512(R_j^i - \bar{R}_j^i) \beta^3 b^8)
\end{aligned}$$

$$\begin{aligned}
t_6^i := & [\beta(864b^i b_j c^2 b^2 \beta^2 + 576y^i b_j c^2 b^4 \beta - 1512y^i b_j c^2 b^2 \beta - 108b^i y_j c^2 \beta - 2376b^i b_j c^2 \beta^2 + 162y^i b_j c^2 \beta \\
& + 5424\delta_j^i c^2 b^2 \beta^2 + 3168\delta_j^i c^2 b^4 \beta^2 + 1506\delta_j^i c^2 \beta^2 - 27y^i y_j c^2 - 504y^i y_j c^2 b^4 - 324y^i y_j c^2 b^2 - 648b^i y_j c^2 b^2 \beta) \\
& - (648s^i s_j \beta^3 + 864s_k^i s_j^k \beta^3 - 23832s_0^i s_{0|0} \beta - 424s_{j|0}^i \beta^2 + 848s_{j|0}^i \beta^2 - 4s_{0|0}^i y_j - 4y^i c_0 y_j + 120cy^i cy_j \beta \\
& - 12y^i s_j s_0 - 712\delta_j^i s_m s_0^m \beta^2 + 68y^i cs_{0|0} \beta + 112s_{0|0}^i b_j \beta - 648b^i s_m s_0^m \beta^3 - 536b^i cs_{0|0} \beta^2 - 136y^i cs_{0|0} \beta \\
& - 68y^i s_{j|0} \beta + 136y^i s_{0|0} \beta + 356y^i s_m s_0^m \beta^2 - 2144s_{j|0}^i b^2 \beta^2 - 64s_{0|0}^i y_j b^8 - 128s_{0|0}^i y_j b^6 - 96s_{0|0}^i y_j b^4 \\
& - 32s_{0|0}^i y_j b^2 - 8y^i cy_j s_0 - 8y^i cy_j c \beta - 48y^i c_0 y_j b^4 - 24y^i c_0 y_j b^2 - 32y^i c_0 y_j b^6 + 7104s_{j|0}^i \beta^2 b^4 + 4y^i y_j s_m s_0^m \\
& + 8b^i y_j s_{0|0} + 40b^i y_j s_0^2 + 4y^i b_j s_{0|0} + 20y^i b_j s_0^2 + 536b^i s_{j|0} \beta^2 - 1072\delta_j^i s_0 \beta^2 + 4096s_{j|0}^i \beta^2 b^6 + 512s_{j|0}^i \beta^2 b^8 \\
& + 120b^i c_0 y_j \beta + 80\delta_j^i s_0^2 \beta - 1072b^i s_{0|0} \beta^2 - 3552s_{j|0}^i \beta^2 b^4 - 2048s_{j|0}^i \beta^2 b^6 - 256s_{j|0}^i \beta^2 b^8 + 4288s_{j|0}^i b^2 \beta^2 \\
& + 1072b^i cs_{j|0} \beta^2 + 536s^i cy_j \beta^2 - 68\delta_j^i s_{0|0} \beta + 144y^i s_j s_0 b^4 + 864b^i s_j s_0 \beta + 136y^i s_j s_0 \beta - 80s^i y_j s_0 \beta \\
& + 336y^i cs_{0|0} \beta^2 b^2 + 528y^i cs_{0|0} \beta b^4 + 256y^i cs_{0|0} \beta b^6 - 672y^i cs_{j|0} \beta^2 b^2 - 1056y^i cs_{j|0} \beta b^4 - 512y^i cs_{j|0} \beta b^6 \\
& + 32y^i y_j s_m s_0^m b^6 + 416y^i b_j s_0^2 b^2 + 1248y^i s_m s_0^m \beta^2 b^4 + 256y^i s_m s_0^m \beta^2 b^6 - 256\delta_j^i s_{0|0} \beta b^6 \\
& + 1024\delta_j^i s_0^2 b^5 \beta - 352\delta_j^i s_0^2 b^4 \beta - 512\delta_j^i s_m s_0^m b^6 \beta^2 + 448\delta_j^i s_0^2 b \beta + 1408\delta_j^i s_0^2 b^3 \beta + 320y^i b_j s_0^2 b^4 + 56y^i b_j c \beta s_0 \\
& - 512b^i s_{0|0} \beta^2 b^6 - 864b^i s_m s_0^m b^2 \beta^3 + 1536s^i cy_j \beta^2 b^4 + 512b^i cs_{j|0} \beta^2 b^6 + 1776s^i cy_j b^2 \beta^2 - 1776b^i cs_{0|0} b^2 \beta^2 \\
& - 112y^i s_j c \beta^2 - 128y^i b_j s_0^2 b^3 - 3072\delta_j^i s_0 \beta^2 b^4 + 152b^i y_j s_m s_0^m \beta + 40y^i b_j s_m s_0^m \beta + 256s^i cy_j \beta^2 b^6 \\
& - 72s^i b_j s_0 \beta^2 - 1536b^i cs_{0|0} \beta^2 b^4 - 256y^i s_{j|0} \beta b^6 + 1024b^i b_j cs_0 b^5 \beta^2 - 256b^i b_j cs_0 b^4 \beta^2 + 3712b^i b_j cs_0 b \beta^2 \\
& + 5632b^i b_j cs_0 b^3 \beta^2 - 256b^i b_j cs_0 b^2 \beta^2 - 256s_k^i s_0^k y_j \beta b^8 - 648s_0^i b_j s_0 \beta - 416s_k^i s_0^k y_j b^2 \beta - 960s_k^i s_0^k y_j \beta b^4 \\
& - 896s_k^i s_0^k y_j \beta b^6 + 72(R_j^i - \bar{R}_j^i) \beta + 1152(R_j^i - \bar{R}_j^i) \beta b^4 + 1152(R_j^i - \bar{R}_j^i) \beta b^6 \\
& + 480(R_j^i - \bar{R}_j^i) \beta b^2 + 384(R_j^i - \bar{R}_j^i) \beta b^8 - 2592s_0^i b_j s_0 b^2 \beta - 2592s_0^i b_j s_0 \beta b^4 - 1440cy^i b_j s_0 b^2 \beta \\
& - 1344cy^i b_j s_0 b^4 - 256cy^i b_j s_0 b^6 \beta - 64y^i b_j s_{0|0} b^6 - 160\delta_j^i s_0^2 b^2 \beta - 256b^i y_j s_0^2 b^5 + 64b^i y_j s_{0|0} b^6 \\
& + 16b^i y_j c \beta s_0 + 64b^i y_j s_0^2 b^4 - 64b^i y_j s_0^2 b + 112b^i y_j s_0^2 b^2 - 256b^i y_j s_0^2 b^3 + 48b^i y_j s_{0|0} b^2 + 96b^i y_j s_{0|0} b^4
\end{aligned}$$

$$\begin{aligned}
& +32y^i cy_j s_0 b - 56y^i cy_j s_0 b^2 + 128y^i cy_j s_0 b^3 + 32y^i y_j c^2 \beta b - 32y^i c^2 y_j c \beta b^2 + 128y^i y_j c^2 \beta b^3 - 336y^i s_{j|0} b^2 \beta \\
& - 528y^i s_{j|0} \beta b^4 - 512\delta_j^i s_0 b^6 \beta^2 - 1184b^i c b_j s_0 \beta^2 + 192b^i y_j c^2 \beta^2 + 1056y^i s_{0|j} \beta b^4 + 512y^i s_{0|j} \beta b^6 \\
& - 3552\delta_j^i s_0 b^2 \beta^2 + 24y^i y_j s_m s_0^m b^2 + 48y^i y_j s_m s_0^m b^4 + 592b^i s_j c \beta^3 + 1272y^i s_m s_0^m b^2 \beta^2 + 224\delta_j^i c s_0 \beta^2 \\
& - 2544\delta_j^i s_m s_0^m b^2 \beta^2 - 2496\delta_j^i s_m s_0^m b^4 \beta^2 - 336\delta_j^i s_{0|0} b^2 \beta - 528\delta_j^i s_{0|0} b^4 \beta + 224y^i c b_j s_0 \beta - 128y^i b_j s_0^2 b \\
& + 3072b^i c s_{j0} \beta^2 b^4 - 256b^i c s_{0j} \beta^2 b^6 + 3552b^i c s_{j0} b^2 \beta^2 + 384b^i c_0 y_j \beta b^6 + 1536cy^i s_j \beta^2 b^4 + 256cy^i s_j \beta^2 b^6 \\
& - 416cy^i b_j s_0 \beta + 1728s_k^i s_0^k b_j b^2 \beta^2 + 1728s_k^i s_0^k b_j \beta^2 b^4 + 48cy^i y_j s_0 b^2 + 96cy^i y_j s_0 b^4 + 64cy^i y_j s_0 b^6 \\
& + 576c^2 y^i y_j b^2 \beta + 864c^2 y^i y_j \beta b^4 + 384c^2 y^i y_j \beta b^6 + 1776cy^i s_j b^2 \beta^2 + 2592b^i s_j s_0 b^2 \beta + 1728b^i s_j s_0 \beta b^4 \\
& - 384s^i y_j s_0 b^2 \beta + 256y^i b_j c \beta s_0 b^5 + 320y^i b_j c \beta s_0 b^4 - 128y^i b_j c \beta s_0 b - 192y^i b_j s_m s_0^m b^2 \beta - 672y^i b_j s_m s_0^m b^4 \beta \\
& + 1664b^i b_j s_0^2 b^2 \beta + 3712b^i b_j s_0^2 b \beta + 704\delta_j^i c \beta s_0 b^2 \beta + 448\delta_j^i c s_0 b \beta^2 + 1408\delta_j^i c s_0 b^3 \beta^2 - 2048y^i c b_j s_0 b^5 \beta \\
& - 256b^i b_j s_{0|0} \beta b^6 + 1024b^i b_j s_0^2 b^5 \beta - 256b^i b_j s_0^2 b^4 \beta + 2368b^i s_j s_0 b \beta^2 - 2368b^i s_j c \beta^3 + 1024b^i s_j c \beta^3 b^2 \\
& - 576s^i y_j s_0 \beta b^4 + 272y^i b_j c \beta s_0 b^2 - 128y^i b_j c \beta s_0 b^3 + 1408y^i s_j c \beta^3 \beta^2 - 256y^i b_j s_m s_0^m b^6 \beta - 1536b^i cy_j s_0 b^5 \beta \\
& + 240b^i cy_j s_0 b^2 \beta - 768b^i cy_j s_0 b \beta + 2304b^i cy_j s_0 b^3 \beta + 576b^i y_j c^2 b^2 \beta^2 - 768b^i y_j c^2 b \beta^2 - 2304b^i y_j c^2 b^3 \beta^2 \\
& + 384b^i cy_j s_0 \beta b^4 + 384b^i y_j c^2 b^4 \beta^2 - 1536b^i y_j c^2 b^5 \beta^2 - 2016b^i b_j s_m s_0^m b^2 \beta^2 + 64b^i y_j c \beta s_0 b^4 \\
& - 448y^i s_j s_0 b \beta - 1408y^i s_j s_0 b^3 \beta - 352y^i s_j c b^2 \beta^2 + 448y^i s_j c b \beta^2 - 1440b^i b_j s_{0|0} b^2 \beta - 1344b^i b_j s_{0|0} b^4 \beta \\
& - 256b^i y_j c \beta s_0 b^5 - 64b^i y_j c \beta s_0 b + 64b^i y_j c \beta s_0 b^2 - 256b^i y_j c \beta s_0 b^3 + 232y^i s_j s_0 b^2 \beta + 64y^i s_j s_0 \beta b^4 \\
& - 1024y^i s_j s_0 b^5 \beta - 256y^i s_j c b^4 \beta^2 + 1024y^i s_j c b^5 \beta^2 + 672b^i y_j s_m s_0^m b^2 \beta + 864b^i y_j s_m s_0^m b^4 \beta \\
& - 256b^i s_j s_0 b^2 b^4 + 288s^i b_j s_0 b^2 \beta^2 + 4736b^i c b_j s_0 b \beta^2 - 256s^i y_j s_0 b^6 \beta + 5632b^i b_j s_0^2 b^3 \beta \\
& + 80b^i b_j c s_0 \beta^2 - 4096b^i s_j c b^3 \beta^3 + 1024b^i s_j s_0 b^5 \beta^2 + 256b^i s_j c b^4 \beta^3 - 1024b^i s_j c b^5 \beta^3 + 4096b^i s_j s_0 b^3 \beta^2 \\
& + 1024\delta_j^i c s_0 b^5 \beta^2 + 512\delta_j^i c s_0 b^4 \beta^2 + 256b^i y_j s_m s_0^m b^6 \beta + 8192b^i c b_j s_0 b^3 \beta^2 - 512b^i c b_j s_0 b^2 b^4 + 2048b^i c b_j s_0 b^5 \beta^2 \\
& + 704y^i c b_j s_0 b^2 \beta - 896y^i c b_j s_0 b \beta - 2816y^i c b_j s_0 b^3 \beta + 512y^i c b_j s_0 \beta b^4 - 2048b^i c b_j s_0 b^2 \beta^2 - 1408b^i s_j s_0 b^2 \beta^2 \\
& - 64s_k^i s_0^k y_j \beta + 536cy^i s_j \beta^2 + 864s^i s_j b^2 \beta^3 + 432s_k^i s_0^k b_j \beta^2 + 2592s_k^i s_j^k b^2 \beta^3 + 1728s_k^i s_0^k \beta^3 b^4 \\
& - 158880s_0^i s_{0j} b^2 \beta - 381312s_0^i s_{0j} \beta b^4 - 381312s_0^i s_{0j} \beta b^6 - 127104s_0^i s_{0j} \beta b^8 + 8cy^i y_j s_0 + 2480b^i b_j s_0^2 \beta \\
& - 1440b^i b_j s_m s_0^m \beta^2 - 416b^i b_j s_{0|0} \beta + 192y^i s_j s_0 b^6 - 48b^i cy_j s_0 \beta - 48y^i b_j s_{0|0} b^4 + 576b^i c_0 y_j b^2 \beta \\
& + 864b^i c_0 y_j \beta b^4 + 256y^i b_j s_0^2 b^5 + 672y^i s_{0|j} b^2 \beta - 80y^i cy_j s_0 b^4 + 128y^i cy_j s_0 b^5 - 32y^i cy_j c \beta b^4 \\
& + 128y^i cy_j c \beta b^5 + 1536b^i s_{j|0} \beta^2 b^4 + 256b^i s_{j|0} \beta^2 b^6 - 3552b^i s_{0|j} b^2 \beta^2 - 3072b^i s_{0|j} \beta^2 b^4 - 1144b^i s_j s_0 \beta^2 \\
& + 704s_{0|0}^i b_j b^2 \beta + 1536s_{0|0}^i b_j \beta b^4 + 1280s_{0|0}^i b_j \beta b^6 + 256s_{0|0}^i b_j \beta b^8 + 1776b^i s_{j|0} b^2 \beta^2) \\
& - (-1620s_0^i b_j c \beta^2 + 1944y^i s_j c b^2 \beta^2 + 864y^i s_j c \beta^2 b^4 - 3296b^i s_j c \beta^3 b^2 - 512b^i s_j c \beta^3 b^4 + 972y^i s_j c \beta^2 \\
& - 2440b^i c_j \beta^3 - 306\delta_j^i c_0 \beta^2 + 2y^i y_j c_0 - 2440\delta_j^i c \beta^3 + 612y^i c_j \beta^2 + 1692b^i s_j c \beta^2 - 36y^i s_j c \beta - 684b^i b_j c_0 \beta^2 \\
& - 8y^i y_j c^2 \beta + 12b^i y_j c_0 \beta + 4y^i y_j c s_0 - 592g^i y_j c \beta^2 + 840\delta_j^i c^2 \beta^3 - 1260\delta_j^i c_0 b^2 \beta^2 - 1584\delta_j^i c_0 b^4 \beta^2 \\
& - 2144b^i b_j c^2 \beta^3 - 708b^i y_j c^2 \beta^2 - 512\delta_j^i c \beta^3 b^6 - 6432\delta_j^i c \beta^3 b^2 + 24y^i y_j c_0 b^4 + 12y^i y_j c_0 b^2 + 576b^i s_j c \beta^5 \\
& - 4992\delta_j^i s_{0|0} b^2 \beta^3 - 3648\delta_j^i s_{0|0} b^4 \beta^3 + 12y^i y_j c^2 \beta + 840y^i b_j c^2 \beta^2 - 6432b^i c_j b^2 \beta^3 - 4224b^i c_j \beta^3 b^4 \\
& - 512b^i c_j b^6 \beta^3 + 2520y^i c_j b^2 \beta^2 + 3168y^i c_j \beta^2 b^4 + 1152y^i c_j \beta^2 b^6 + 16y^i y_j c_0 b^6 - 576\delta_j^i c_0 b^6 \beta^2 - 228\delta_j^i c s_0 \beta^2 \\
& - 24y^i b_j c_0 \beta - 4224\delta_j^i c \beta^3 b^4 + 576g^i b_j c \beta^3 - 24b^i y_j c s_0 b^2 \beta - 192b^i y_j c s_0 b \beta - 384b^i y_j c s_0 b^3 \beta - 48b^i y_j c^2 b^2 \beta^2 \\
& + 768y^i b_j c^2 b^4 \beta^2 - 480y^i b_j c s_0 b \beta + 384y^i b_j c s_0 b^3 \beta + 912y^i b_j c^2 b^2 \beta^2 - 480y^i b_j c^2 b \beta^2 + 384y^i b_j c^2 b^3 \beta^2 \\
& + 1704y^i b_j c s_0 b^2 \beta + 1536y^i b_j c s_0 b^5 \beta + 96y^i b_j c s_0 b^4 \beta + 1536y^i b_j c^2 b^5 \beta^2 + 4608b^i b_j c^2 b^3 \beta^3 + 576b^i b_j c^2 b^2 \beta^3 \\
& + 5760b^i b_j c^2 b \beta^3 + 5760b^i b_j c s_0 b \beta^2 + 4608b^i b_j c s_0 b^3 \beta^2 + 1728b^i b_j c s_0 b^2 \beta^2 - 288b^i y_j c s_0 b^4 \beta - 192b^i y_j c^2 b \beta^2 \\
& - 384b^i y_j c^2 b^3 \beta^2 + 432\beta s_0^i y_j c b^4 + 288\beta s_0^i y_j c b^6 - 3032b^i s_j c \beta^3 - 4536s_0^i b_j c b^2 \beta^2 - 2592s_0^i b_j c \beta^2 b^4 \\
& + 48cy^i y_j c b^2 \beta + 48cy^i y_j c \beta b^4 - 1440cy^i b_j c b^2 \beta^2 - 576cy^i b_j c \beta^2 b^4 + 216\beta s_0^i y_j c b^2 + 216y^i s_j c b^2 \beta \\
& + 1152b^i s_j c \beta^2 b^4 + 3312b^i s_j c b^2 \beta^2 - 2208g^i y_j c b^2 \beta^2 - 512g^i y_j c b^6 \beta^2 - 2496\delta_j^i c s_0 b^4 \beta^2 + 2304\delta_j^i c^2 b^5 \beta^3 \\
& + 576y^i s_j c \beta b^6 - 576b^i b_j c_0 b^4 \beta^2 + 2304\delta_j^i c s_0 b^5 \beta^2 + 6480b^i b_j c s_0 \beta^2 + 864y^i s_j c \beta b^4 + 8576b^i s_j c \beta^3 \\
& + 11264b^i s_j c b^3 \beta^3 + 2048b^i s_j c b^5 \beta^3 + 720b^i b_j c^2 \beta^3 - 1440b^i b_j c_0 b^2 \beta^2 - 2304g^i y_j c b^2 b^4 + 228y^i b_j c^2 \beta^2 \\
& - 264y^i b_j c_0 b^2 \beta - 24b^i y_j c^2 \beta^2 + 184y^i y_j c s_0 b^4 - 64y^i y_j c s_0 b^5 - 32y^i y_j c^2 \beta b^4 - 64y^i y_j c^2 \beta b^5 - 624y^i b_j c_0 b^4 \beta
\end{aligned}$$

$$\begin{aligned}
& +768b^i c y_j c b^2 \beta^2 + 2112\delta_j^i c^2 \beta b^2 \beta^2 + 1680\delta_j^i c^2 \beta b \beta^2 - 4608y^i s_j c b^5 \beta^2 + 4224\delta_j^i c^2 b^3 \beta^3 \\
& -2784\delta_j^i c s_0 b^2 \beta^2 + 1680\delta_j^i c s_0 b \beta^2 + 4224\delta_j^i c s_0 b^3 \beta^2 - 3360y^i s_j c b \beta^2 - 384y^i b_j c_0 b^6 \beta - 16y^i y_j c s_0 b \\
& +100y^i y_j c s_0 b^2 - 64y^i y_j c s_0 b^3 - 16y^i y_j c^2 \beta b - 32y^i y_j c^2 \beta b^2 - 64y^i y_j c^2 \beta b^3 - 144y^i b_j c s_0 \beta + 48b^i y_j c_0 b^2 \beta \\
& +48b^i y_j c_0 b^4 \beta - 4608y^i b_j c^2 b^5 \beta^2 + 1152g^i b_j c \beta^3 b^2 + 8576b^i b_j c^2 b \beta^3 - 8448y^i s_j c b^3 \beta^2 + 1152\delta_j^i c^2 b^4 \beta^3 \\
& -108y^i y_j c^2 b^2 \beta - 192y^i y_j c^2 \beta b^4 + 2048b^i b_j c^2 b^5 \beta^3 + 2112y^i b_j c^2 b^2 \beta^2 - 3360y^i b_j c^2 b \beta^2 - 8448y^i b_j c^2 b^3 \beta^2 \\
& +1152y^i b_j c^2 \beta^2 b^4 - 48b^i y_j c s_0 \beta - 2816b^i b_j c^2 \beta^3 b^2 - 512b^i b_j c^2 \beta^3 b^4 + 11264b^i b_j c^2 b^3 \beta^3 + 12y^i y_j c^2 \beta \\
& -684y^i b_j c^2 \beta^2 + 36\beta s_0^i y_j c] \\
t_8^i := & [(4(2b^2 + 1))(-2s_k^i s_0^k b_j - 22s^i s_j \beta - 14s_k^i s_j^k \beta - 2cy^i s_j - 2b^i s_{0|j} + 4b^i s_{0|j} + 2b^i c s_{0j} + 2\delta_j^i s_m s_0^m \\
& +12s_{0|j}^i b^4 + 6s_{0|j}^i b^2 + 8s_{0|j}^i b^6 - 24s_{j0}^i b^4 - y^i s_m s_0^m - 2s^i c y_j - 4b^i c s_{j0} + 4\delta_j^i s_0 - 16s_{j0}^i b^6 \\
& -12s_{j0}^i b^2 + 8b^i c s_{0j} b^4 + 8b^i c s_{0j} b^2 - 16b^i c s_{j0} b^4 - 16b^i c s_{j0} b^2 - 8s^i c y_j b^4 - 8s^i c y_j b^2 - 8b^i s_{0|j} b^2 \\
& +22b^i s_m s_0^m \beta + 10b^i s_j s_0 - 8b^i s_{0|j} b^4 + 2s^i b_j s_0 + 16\delta_j^i s_0 b^2 + 16\delta_j^i s_0 b^4 + 8b^i c b_j s_0 \\
& +8\delta_j^i s_m s_0^m b^2 + 8\delta_j^i s_m s_0^m b^4 + 16b^i s_{0|j} b^4 - 4b^i s_j c \beta - 4y^i s_m s_0^m b^4 - 4y^i s_m s_0^m b^2 + 16b^i b_j s_m s_0^m \\
& +16b^i s_{0|j} b^2 - 32b^i c b_j s_0 b - 16b^i s_j s_0 b - 32b^i s_j s_0 b^3 + 40b^i b_j s_m s_0^m b^2 + 16b^i b_j s_m s_0^m b^4 + 8b^i s_j s_0 b^2 \\
& +16b^i s_j c \beta b - 8b^i s_j c \beta b^2 + 32b^i s_j c \beta b^3 + 16b^i c b_j s_0 b^2 + 52b^i s_m s_0^m b^2 \beta + 16b^i s_m s_0^m \beta b^4 - 16s^i b_j s_0 b^4 \\
& -64b^i c b_j s_0 b^3 - 2s_{j0}^i + s_{0|j}^i - 4s^i b_j s_0 b^2 - 8cy^i s_j b^4 - 52s^i s_j b^2 \beta - 16s^i s_j \beta b^4 - 60s_k^i s_j^k b^2 \beta - 72s_k^i s_j^k \beta b^4 \\
& -16s_k^i s_j^k \beta b^6 - 8cy^i s_j b^2 - 24s_k^i s_0^k b_j b^4 - 12s_k^i s_0^k b_j b^2 - 16s_k^i s_0^k b_j b^6) - (4y^i c_j - 36s_0^i b_j c + 36b^i s_j c - 2\delta_j^i c_0 \\
& -120b^i c_j \beta - 24\delta_j^i c_0 b^4 - 12\delta_j^i c_0 b^2 - 4\delta_j^i c s_0 + 8\delta_j^i c^2 \beta - 16\delta_j^i c_0 b^6 - 312b^i s_j c \beta - 128y^i s_j c \beta^3 \\
& -128y^i s_j c b^5 - 112\delta_j^i c s_0 b^4 + 64\delta_j^i c s_0 b^5 + 32\delta_j^i c^2 \beta b^4 + 64\delta_j^i c^2 \beta b^5 + 20y^i s_j c b^2 + 16\delta_j^i c s_0 b - 64\delta_j^i c s_0 b^2 \\
& +64\delta_j^i c s_0 b^3 + 8y^i s_j c b^4 - 48s^i y_j c b^2 - 120\delta_j^i c \beta - 8s^i y_j c + 8y^i c b_j c + 32y^i c_j b^6 - 12b^i c y_j c + 8y^i s_j c \\
& -12b^i b_j c_0 + 24y^i c_j b^2 + 144b^i s_j c b^2 - 384b^i c_j \beta b^6 + 144b^i s_j c b^4 - 576b^i c_j b^2 \beta - 864b^i c_j \beta b^4 - 32y^i c^2 b_j b \\
& +32y^i c^2 b_j b^2 - 128y^i c^2 b_j b^3 + 32y^i c^2 b_j b^4 - 128y^i b_j c^2 b^5 - 32y^i s_j c b + 408b^i b_j c s_0 + 24b^i b_j c^2 \beta - 48b^i b_j c_0 b^4 \\
& -48b^i b_j c_0 b^2 - 192b^i c b_j c \beta - 64s^i y_j c b^6 - 96s^i y_j c b^4 + 56s^i b_j c \beta - 576\delta_j^i c b^2 \beta - 864\delta_j^i c \beta b^4 - 384\delta_j^i c \beta b^6 \\
& -216s_0^i b_j c b^2 - 432s_0^i b_j c b^4 - 288s_0^i b_j c b^6 - 48cy^i b_j c b^2 - 48cy^i b_j c b^4 + 288b^i b_j c s_0 b^4 + 192b^i b_j c s_0 b \\
& +528b^i b_j c s_0 b^2 + 384b^i b_j c s_0 b^3 + 768b^i s_j c b \beta + 192b^i b_j c^2 \beta b + 48b^i b_j c^2 \beta b^2 + 384b^i b_j c^2 \beta b^3 \\
& +2304b^i s_j c \beta^3 + 1536b^i s_j c \beta^5 + 432s^i b_j c b^2 \beta + 768s^i b_j c \beta b^4 + 256s^i b_j c \beta b^6 + 768b^i b_j c^2 b \beta \\
& +2304b^i b_j c^2 b^3 \beta - 744b^i s_j c b^2 \beta - 384b^i c b_j c \beta b^4 - 576b^i c b_j c b^2 \beta + 1536b^i b_j c^2 b^5 \beta - 384b^i s_j c \beta b^4 \\
& -12y^i b_j c^2 - 24b^i y_j c^2 b^2 + 16\delta_j^i c^2 \beta b + 32\delta_j^i c^2 \beta b^2 + 64\delta_j^i c^2 \beta b^3) - (-48\delta_j^i c^2 \beta + 12b^i y_j c^2 + 9y^i b_j c^2 \\
& +24b^i y_j c^2 b^2 + 600b^i b_j c^2 \beta + 48y^i b_j c^2 b^4 + 96y^i b_j c^2 b^2 - 360\delta_j^i c^2 b^4 \beta - 312\delta_j^i c^2 b^2 \beta + 120b^i b_j c^2 b^2 \beta)]
\end{aligned}$$

## 11. APPENDIX 6: COEFFICIENTS IN (14)

$$\begin{aligned}
A_0 & := -288\beta^9 r_{00}^2 (-11 + 8n), \\
A_1 & := 48\beta^8 (-54r_{00|0}\beta - 104r_{00}^2 b^2 - 295r_{00}^2 - 80r_{00}^2 n b^2 + 220r_{00}^2 n + 36r_{00|0} n \beta) \\
A_2 & := 24\beta^7 (108(\text{Ric} - \overline{\text{Ric}})\beta^2 - 144r_{00|0} n b^2 \beta + 192r_{00} s_0 n b \beta - 384r_{00} r_0 b \beta + 192r_{00} r_0 n b \beta - 96r_{00} s_0 n \beta \\
& \quad - 342r_{00|0} n \beta + 192r_{00|0} \beta b^2 + 120r_{00} s_0 \beta - 144r_{00} r_0 \beta + 96r_{00} r_0 n \beta - 384r_{00} s_0 b \beta + 492r_{00|0} \beta \\
& \quad + 1144r_{00}^2 + 928r_{00}^2 b^2 + 64r_{00}^2 b^4 - 865r_{00}^2 n - 64r_{00}^2 n b^4 - 712r_{00}^2 n b^2) \\
A_3 & := -12\beta^6 (162\beta^2 \theta - 384r_{00} s_0 n b^2 \beta + 1696r_{00} s_0 n b \beta + 512r_{00} s_0 n b^3 \beta + 256r_{00} r_0 n b^2 \beta + 512r_{00} s_0 b^2 \beta \\
& \quad - 720r_{00} s_0 n \beta - 768r_{00} s_0 b^3 \beta - 3168r_{00} s_0 b \beta - 320r_{00} r_0 b^2 \beta + 848r_{00} r_0 n \beta - 768r_{00} r_0 b^3 \beta \\
& \quad - 3168r_{00} r_0 b \beta - 1272r_{00|0} n b^2 \beta - 192r_{00|0} n b^4 \beta + 1044(\text{Ric} - \overline{\text{Ric}})\beta^2 + 1696r_{00} r_0 n b \beta \\
& \quad + 512r_{00} r_0 n b^3 \beta + 576(\text{Ric} - \overline{\text{Ric}})\beta^2 b^2 + 512r_{00}^2 b^4 + 3648r_{00}^2 b^2 - 1923r_{00}^2 n + 1916r_{00|0} \beta)
\end{aligned}$$

$$\begin{aligned}
& +144r_{0m}r_0^m\beta^2 + 288r_{0m}s_0^m\beta^2 + 360s_{0|0}\beta^2 + 224r_{0|0}\beta b^4 + 592r_{00}s_0\beta - 1360r_{00}r_0\beta \\
& -1398r_{00|0}n\beta + 1568r_{00|0}\beta b^2 - 2696r_{00}^2nb^2 - 544r_{00}^2nb^4 - 288r_{0m}s_0^m n\beta^2 - 144s_{0|0}n\beta^2 \\
& +2560r_{00}^2 - 144r_{00}r_m^m\beta^2 - 144r_{00|m}b^m\beta^2 + 144r_{0m|0}b^m\beta^2 - 162n\beta^2\theta) \\
A_4 := & 2\beta^5(3726\beta^2\theta - 8896r_{00}s_0nb^2\beta - 1024r_{00}s_0n\beta b^4 + 18976r_{00}s_0nb\beta + 12544r_{00}s_0nb^3\beta \\
& +1024r_{00}s_0n\beta b^5 + 6272r_{00}r_0nb^2\beta + 512r_{00}r_0n\beta b^4 + 1024r_{00}s_0b^4\beta + 10432r_{00}s_0b^2\beta \\
& -6568r_{00}s_0n\beta - 1024r_{00}s_0b^5\beta - 15616r_{00}s_0b^3\beta - 32608r_{00}s_0b\beta - 512r_{00}r_0b^4\beta - 8192r_{00}r_0b^2\beta \\
& +9488r_{00}r_0n\beta - 1024r_{00}r_0b^5\beta - 15616r_{00}r_0b^3\beta - 32608r_{00}r_0b\beta - 14232r_{00|0}nb^2\beta - 4704r_{00|0}nb^4\beta \\
& -256r_{00|0}nb^6\beta + 2304s_0^2nb\beta^2 + 2304rr_{00}b\beta^2 + 1152r_{00}s_0n\beta^2 - 8064r_{00}s_0b\beta^2 - 3456r_{0m}s_0^m nb^2\beta^2 \\
& -1728s_{0|0}nb^2\beta^2 - 2592n\beta^2b^2\theta - 1728r_{00}r_m^m b^2\beta^2 - 1728r_{00|m}b^m b^2\beta^2 + 1728r_{0m|0}b^m b^2\beta^2 \\
& +13068(\text{Ric} - \overline{\text{Ric}})\beta^2 + 18976r_{00}r_0nb\beta + 12544r_{00}r_0nb^3\beta + 1024r_{00}r_0n\beta b^5 + 2304r_{00}s_0nb\beta^2 \\
& +15552(\text{Ric} - \overline{\text{Ric}})\beta^2b^2 + 3456(\text{Ric} - \overline{\text{Ric}})\beta^2b^4 + 324\beta^2\sigma + 5280r_{00}^2b^4 + 25296r_{00}^2b^2 - 8049r_{00}^2n \\
& +12584r_{00|0}\beta + 144s_0^2\beta^2 + 576r_0^2\beta^2 + 3888r_{0m}r_0^m\beta^2 + 6624r_{0m}s_0^m\beta^2 + 9144s_{0|0}\beta^2 \\
& +1296s_{0|m}^m\beta^3 + 4800r_{00|0}\beta b^4 + 256r_{00|0}b^6\beta + 640r_{00}s_0\beta - 16496r_{00}r_0\beta - 9698r_{00|0}n\beta \\
& +15840r_{00|0}\beta b^2 - 6912s_0^2b\beta^2 - 576rr_{00}\beta^2 - 2304r_0^2b\beta^2 + 288r_{00}s_0\beta^2 - 17112r_{00}^2nb^2 - 5808r_{00}^2nb^4 \\
& +1728r_{0m}r_0^m b^2\beta^2 + 2880r_{0m}s_0^m b^2\beta^2 - 7344r_{0m}s_0^m n\beta^2 + 4032s_{0|0}b^2\beta^2 - 3672s_{0|0}n\beta^2 + 11085r_{00}^2 \\
& -3888r_{00}r_m^m\beta^2 - 3888r_{00|m}b^m\beta^2 + 3888r_{0m|0}b^m\beta^2 - 324n\beta^2\sigma - 3726n\beta^2\theta + 2592\beta^2b^2\theta) \\
A_5 := & -3\beta^4(4050\beta^2\theta - 9472r_{00}s_0nb^2\beta - 2560r_{00}s_0n\beta b^4 + 13024r_{00}s_0nb\beta + 14080r_{00}s_0nb^3\beta \\
& +2560r_{00}s_0n\beta b^5 + 7040r_{00}r_0nb^2\beta + 1280r_{00}r_0n\beta b^4 + 2048r_{00}s_0b^4\beta + 9536r_{00}s_0b^2\beta \\
& -3520r_{00}s_0n\beta - 1536r_{00}s_0b^5\beta - 13056r_{00}s_0b^3\beta - 20256r_{00}s_0b\beta - 1280r_{00}r_0b^4\beta - 9728r_{00}r_0b^2\beta \\
& +6512r_{00}r_0n\beta - 1536r_{00}r_0b^5\beta - 13056r_{00}r_0b^3\beta - 20256r_{00}r_0b\beta - 9768r_{00|0}nb^2\beta - 5280r_{00|0}nb^4\beta \\
& -640r_{00|0}nb^6\beta - 256s_0^2n\beta^2b^2 + 6016s_0^2nb\beta^2 + 2048s_0^2nb^3\beta^2 - 512rr_{00}b^2\beta^2 + 6400rr_{00}b\beta^2 \\
& +2048rr_{00}b^3\beta^2 + 3008r_{00}s_0n\beta^2 + 512r_{00}s_0\beta^2b^2 - 20352r_{00}s_0b\beta^2 - 6144r_{00}s_0b^3\beta^2 - 9024r_{0m}s_0^m nb^2\beta^2 \\
& -1536r_{0m}s_0^m nb^4\beta^2 - 4512s_{0|0}nb^2\beta^2 - 768s_{0|0}nb^4\beta^2 - 6048n\beta^2b^2\theta - 4800r_{00}r_m^m b^2\beta^2 \\
& -768r_{00}r_m^m b^4\beta^2 - 4800r_{00|m}b^m b^2\beta^2 - 768r_{00|m}b^m b^4\beta^2 + 4800r_{0m|0}b^m b^2\beta^2 \\
& +768r_{0m|0}b^m b^4\beta^2 + 10316(\text{Ric} - \overline{\text{Ric}})\beta^2 + 13024r_{00}r_0nb\beta + 14080r_{00}r_0nb^3\beta + 2560r_{00}r_0n\beta b^5 \\
& +1024r_{00}n\beta^2b^2 + 6016r_{00}n\beta b^2 + 2048r_{00}nb^3\beta^2 + 1024(\text{Ric} - \overline{\text{Ric}})\beta^2b^6 + 19776(\text{Ric} - \overline{\text{Ric}})\beta^2b^2 \\
& +9600(\text{Ric} - \overline{\text{Ric}})\beta^2b^4 + 612\beta^2\sigma + 3488r_{00}^2b^4 - 1728n\beta^2b^4\theta + 12728r_{00}^2b^2 - 2461r_{00}^2n \\
& +5710r_{00|0}\beta - 1648s_0^2\beta^2 + 1600r_0^2\beta^2 + 4944r_{0m}r_0^m\beta^2 + 6880r_{0m}s_0^m\beta^2 + 10856s_{0|0}\beta^2 \\
& +1152s_m s_0^m\beta^3 + 864s_m r_0^m\beta^3 + 576r_m s_0^m\beta^3 + 3744s_{0|m}^m\beta^3 + 4416r_{00|0}\beta b^4 + 512r_{00|0}b^6\beta \\
& -4240r_{00}s_0\beta - 12464r_{00}r_0\beta - 4670r_{00|0}n\beta + 9504r_{00|0}\beta b^2 + 544s_0^2n\beta^2 + 640s_0^2\beta^2b^2 - 16384s_0^2b\beta^2 \\
& -5120s_0^2b^3\beta^2 - 1600rr_{00}\beta^2 + 512r_0^2b^2\beta^2 - 6400r_0^2b\beta^2 - 2048r_0^2b^3\beta^2 - 416r_{00}s_0\beta^2 \\
& -7432r_{00}^2nb^2 - 3760r_{00}^2nb^4 + 4800r_{0m}r_0^m b^2\beta^2 + 768r_{0m}r_0^m b^4\beta^2 + 6208r_{0m}s_0^m b^2\beta^2 \\
& +1024r_{0m}s_0^m b^4\beta^2 - 8736r_{0m}s_0^m n\beta^2 + 10304s_{0|0}b^2\beta^2 + 1664s_{0|0}b^4\beta^2 - 4368s_{0|0}n\beta^2 \\
& -576s_m s_0^m n\beta^3 + 3593r_{00}^2 - 4944r_{00}r_m^m\beta^2 - 4944r_{00|m}b^m\beta^2 + 4944r_{0m|0}b^m\beta^2 - 216s_m s_0^m\beta^2 \\
& -576s_0r_m^m\beta^3 - 576s_{0|m}b^m\beta^3 + 288s_{m|0}b^m\beta^3 + 2304s_{0|m}^m b^2\beta^3 + 1728\beta^2b^4\theta - 612n\beta^2\sigma \\
& -4050n\beta^2\theta + 6048\beta^2b^2\theta + 576\beta^2b^2\sigma - 576n\beta^2b^2\sigma) \\
A_6 := & \beta^3(-2304n\beta^2b^6\theta + 11061\beta^2\theta - 1728n\beta^2b^4\sigma - 24672r_{00}s_0nb^2\beta - 11712r_{00}s_0n\beta b^4 \\
& +24336r_{00}s_0nb\beta + 38016r_{00}s_0nb^3\beta + 11520r_{00}s_0n\beta b^5 + 19008r_{00}r_0nb^2\beta + 5760r_{00}r_0n\beta b^4 \\
& +6912r_{00}s_0b^4\beta + 21600r_{00}s_0b^2\beta - 4980r_{00}s_0n\beta - 768r_{00}s_0b^5\beta - 20352r_{00}s_0b^3\beta \\
& -33744r_{00}s_0b\beta - 5760r_{00}r_0b^4\beta - 28224r_{00}r_0b^2\beta + 12168r_{00}r_0n\beta - 768r_{00}r_0b^5\beta - 20352r_{00}r_0b^3\beta \\
& -33744r_{00}r_0b\beta - 18252r_{00|0}nb^2\beta - 14256r_{00|0}nb^4\beta - 2880r_{00|0}nb^6\beta + 1216s_0^2n\beta^2b^2)
\end{aligned}$$

$$\begin{aligned}
& -512s_0^2n\beta^2b^4 + 28928s_0^2nb\beta^2 + 22016s_0^2nb^3\beta^2 + 2048s_0^2nb^5\beta^2 - 5888rr_{00}b^2\beta^2 \\
& -512rr_{00}b^4\beta^2 + 33152rr_{00}b\beta^2 + 23552rr_{00}b^3\beta^2 + 2048rr_{00}b^5\beta^2 + 14464r_0s_0n\beta^2 \\
& -1344r_0s_0\beta^2b^2 + 768r_0s_0\beta^2b^4 - 94016r_0s_0b\beta^2 - 60416r_0s_0b^3\beta^2 - 5120r_0s_0b^5\beta^2 \\
& -43392r_0ms_0^mnb^2\beta^2 - 16512r_0ms_0^mnb^4\beta^2 - 1024r_0ms_0^mn\beta^2b^6 - 21696s_0|_0nb^2\beta^2 - 8256s_0|_0nb^4\beta^2 \\
& -512s_0|_0n\beta^2b^6 + 4608rs_0b\beta^3 - 26352n\beta^2b^2\theta - 3456s_ms_0^mn\beta^3b^2 - 24864r_0r_m^mb^2\beta^2 - 8832r_0r_m^mb^4\beta^2 \\
& -512r_0r_m^mb^6\beta^2 - 24864r_0|_m b^mb^2\beta^2 - 8832r_0|_m b^mb^4\beta^2 - 512r_0|_m b^mb^6\beta^2 + 24864r_0m|_0 b^mb^2\beta^2 \\
& + 8832r_0m|_0 b^mb^4\beta^2 + 512r_0m|_0 b^mb^6\beta^2 - 1728s_ms_0^mb^2\beta^2 - 3456s_0r_m^m\beta^3b^2 - 3456s_0|_m b^m\beta^3b^2 \\
& + 1728s_m|_0 b^m\beta^3b^2 + 22976(\text{Ric} - \overline{\text{Ric}})\beta^2 + 24336r_0r_0nb\beta + 38016r_0r_0nb^3\beta + 11520r_0r_0n\beta b^5 \\
& + 11008r_0s_0n\beta^2b^2 + 1024r_0s_0n\beta^2b^4 + 28928r_0s_0nb\beta^2 + 22016r_0s_0nb^3\beta^2 + 2048r_0s_0nb^5\beta^2 \\
& + 11776(\text{Ric} - \overline{\text{Ric}})\beta^2b^6 + 512(\text{Ric} - \overline{\text{Ric}})\beta^2b^8 + 62752(\text{Ric} - \overline{\text{Ric}})\beta^2b^2 + 49728(\text{Ric} - \overline{\text{Ric}})\beta^2b^4 \\
& + 2214\beta^2\sigma + 6672r_0^2b^4 - 16416n\beta^2b^4\theta + 19272r_0^2b^2 - 2256r_0^2n + 7554r_0|_0\beta - 20616s_0^2\beta^2 \\
& + 8288r_0^2\beta^2 + 15688r_0mr_0^m\beta^2 + 16912r_0ms_0^m\beta^2 + 31988s_0|_0\beta^2 + 12672s_ms_0^m\beta^3 + 10368s_mr_0^m\beta^3 \\
& + 6912r_ms_0^m\beta^3 + 20520s_0|_m\beta^3 + 8640r_0|_0\beta b^4 + 1536r_0|_0b^6\beta - 18036r_0s_0\beta - 26064r_0r_0\beta \\
& - 6570r_0|_0n\beta + 14832r_0|_0\beta b^2 + 5560s_0^2n\beta^2 - 2112s_0^2\beta^2b^2 + 768s_0^2\beta^2b^4 - 69568s_0^2b\beta^2 - 43264s_0^2b^3\beta^2 \\
& - 4096s_0^2b^5\beta^2 - 8288rr_{00}\beta^2 + 5888r_0^2b^2\beta^2 + 512r_0^2b^4\beta^2 - 33152r_0^2b\beta^2 - 23552r_0^2b^3\beta^2 \\
& - 2048r_0^2b^5\beta^2 - 8640r_0s_0\beta^2 - 9240r_0^2nb^2 - 6504r_0^2nb^4 + 24864r_0mr_0^mb^2\beta^2 + 8832r_0mr_0^mb^4\beta^2 \\
& + 512r_0mr_0^mb^6\beta^2 + 21984r_0ms_0^mb^2\beta^2 + 7680r_0ms_0^mb^4\beta^2 + 512r_0ms_0^mb^6\beta^2 + 1728\beta^2b^4\sigma \\
& - 25688r_0ms_0^mn\beta^2 + 48288s_0|_0b^2\beta^2 + 17088s_0|_0b^4\beta^2 + 1024s_0|_0b^6\beta^2 - 12844s_0|_0n\beta^2 \\
& - 1152r_0\beta^3 - 6480s_ms_0^mn\beta^3 + 6336s_ms_0^m\beta^3b^2 + 5184s_mr_0^m\beta^3b^2 + 3456r_ms_0^m\beta^3b^2 + 3504r_0^2 \\
& - 15688r_0r_m^m\beta^2 - 15688r_0|_m b^mb^2\beta^2 + 15688r_0m|_0 b^mb^2\beta^2 - 2160s_ms_0^m\beta^2 - 6912s_0r_m^m\beta^3 \\
& - 6912s_0|_m b^m\beta^3 + 3456s_m|_0 b^m\beta^3 + 27648s_0|_m b^2\beta^3 + 6912s_0|_m b^4\beta^3 + 648s_m^i s_i^m \beta^4 \\
& + 16416\beta^2b^4\theta - 2214n\beta^2\sigma - 11061n\beta^2\theta + 26352\beta^2b^2\theta + 4320\beta^2b^2\sigma + 2304\beta^2b^6\theta - 4320n\beta^2b^2\sigma)
\end{aligned}$$

$$\begin{aligned}
A_7 := & -\beta^2(-6528n\beta^2b^6\theta + 6171\beta^2\theta - 3744n\beta^2b^4\sigma - 12864r_0s_0nb^2\beta - 9408r_0s_0n\beta b^4 + 9408r_0s_0nb\beta \\
& + 19776r_0s_0nb^3\beta + 8832r_0s_0n\beta b^5 + 9888r_0r_0nb^2\beta + 4416r_0r_0n\beta b^4 + 3840r_0s_0b^4\beta \\
& + 10896r_0s_0b^2\beta - 1488r_0s_0n\beta + 5760r_0s_0b^5\beta - 1152r_0s_0b^3\beta - 11520r_0s_0b\beta - 4416r_0r_0b^4\beta \\
& - 16080r_0r_0b^2\beta + 4704r_0r_0n\beta + 5760r_0r_0b^5\beta - 1152r_0r_0b^3\beta - 11520r_0r_0b\beta - 7056r_0|_0nb^2\beta \\
& - 7416r_0|_0nb^4\beta - 2208r_0|_0nb^6\beta + 8128s_0^2n\beta^2b^2 + 2944s_0^2n\beta^2b^4 + 24608s_0^2nb\beta^2 + 31232s_0^2nb^3\beta^2 \\
& + 6656s_0^2nb^5\beta^2 - 9088rr_{00}b^2\beta^2 - 1792rr_{00}b^4\beta^2 + 30784rr_{00}b\beta^2 + 36352rr_{00}b^3\beta^2 + 7168rr_{00}b^5\beta^2 \\
& + 12304r_0s_0n\beta^2 - 13664r_0s_0\beta^2b^2 - 2432r_0s_0\beta^2b^4 - 76512r_0s_0b\beta^2 - 75264r_0s_0b^3\beta^2 - 13824r_0s_0b^5\beta^2 \\
& - 36912r_0ms_0^mn\beta^2\beta^2 - 23424r_0ms_0^mn\beta^4\beta^2 - 3328r_0ms_0^mn\beta^2b^6 - 18456s_0|_0nb^2\beta^2 - 11712s_0|_0nb^4\beta^2 \\
& - 1664s_0|_0n\beta^2b^6 - 1536rs_0\beta^3b^2 + 16896rs_0b\beta^3 + 6144rs_0\beta^3b^3 - 20712n\beta^2b^2\theta - 11808s_ms_0^mn\beta^3b^2 \\
& - 2304s_ms_0^mn\beta^3b^4 - 23088r_0r_m^mb^2\beta^2 - 13632r_0r_m^mb^4\beta^2 - 1792r_0r_m^mb^6\beta^2 - 23088r_0|_m b^mb^2\beta^2 \\
& - 13632r_0|_m b^mb^4\beta^2 - 1792r_0|_m b^mb^6\beta^2 + 23088r_0m|_0 b^mb^2\beta^2 + 13632r_0m|_0 b^mb^4\beta^2 \\
& + 1792r_0m|_0 b^mb^6\beta^2 - 5184s_ms_0^mb^2\beta^2 - 1728s_ms_0^mb^4\beta^2 - 12672s_0r_m^m\beta^3b^2 - 2304s_0r_m^m\beta^3b^4 \\
& - 12672s_0|_m b^m\beta^3b^2 - 2304s_0|_m b^m\beta^3b^4 + 6336s_m|_0 b^m\beta^3b^2 + 1152s_m|_0 b^m\beta^3b^4 + 1728s_m^i s_i^m \beta^4b^2 \\
& + 11116(\text{Ric} - \overline{\text{Ric}})\beta^2 + 9408r_0r_0nb\beta + 19776r_0r_0nb^3\beta + 8832r_0r_0n\beta b^5 + 15616r_0s_0n\beta^2b^2 \\
& + 3328r_0s_0n\beta^2b^4 + 24608r_0s_0nb\beta^2 + 31232r_0s_0nb^3\beta^2 + 6656r_0s_0nb^5\beta^2 + 18176(\text{Ric} - \overline{\text{Ric}})\beta^2b^6 \\
& + 1792(\text{Ric} - \overline{\text{Ric}})\beta^2b^8 + 40352(\text{Ric} - \overline{\text{Ric}})\beta^2b^2 + 46176(\text{Ric} - \overline{\text{Ric}})\beta^2b^4 - 384n\beta^2b^8\theta - 768n\beta^2b^6\sigma \\
& + 1473\beta^2\sigma + 2760r_0^2b^4 - 20880n\beta^2b^4\theta + 6264r_0^2b^2 - 450r_0^2n + 2172r_0|_0\beta - 31588s_0^2\beta^2 \\
& + 7696r_0^2\beta^2 + 10088r_0mr_0^m\beta^2 + 7872r_0ms_0^m\beta^2 + 19068s_0|_0\beta^2 + 18816s_ms_0^m\beta^3 + 17064s_mr_0^m\beta^3 \\
& + 11376r_ms_0^m\beta^3 + 20688s_0|_m\beta^3 + 2376r_0|_0\beta b^4 + 384r_0|_0b^6\beta - 11712r_0s_0\beta - 11472r_0r_0\beta \\
& - 2004r_0|_0n\beta + 4464r_0|_0\beta b^2 + 7396s_0^2n\beta^2 - 19264s_0^2\beta^2b^2 - 4480s_0^2\beta^2b^4 - 50592s_0^2b\beta^2 - 40320s_0^2b^3\beta^2
\end{aligned}$$

$$\begin{aligned}
& -6144s_0^2b^5\beta^2 - 7696r_{00}\beta^2 + 9088r_0^2b^2\beta^2 + 1792r_0^2b^4\beta^2 - 30784r_0^2b\beta^2 - 36352r_0^2b^3\beta^2 \\
& -7168r_0^2b^5\beta^2 - 13856r_0s_0\beta^2 - 2400r_0^2nb^2 - 2244r_0^2nb^4 + 23088r_0mr_0^m b^2\beta^2 + 13632r_0mr_0^m b^4\beta^2 \\
& +1792r_0mr_0^m b^6\beta^2 + 10512r_0ms_0^m b^2\beta^2 + 4608r_0ms_0^m b^4\beta^2 + 768r_0ms_0^m b^6\beta^2 - 15176r_0ms_0^m n\beta^2 \\
& +39888s_{0|0}b^2\beta^2 + 22752s_{0|0}b^4\beta^2 + 3072s_{0|0}b^6\beta^2 - 7588s_{0|0}n\beta^2 - 4224rs_0\beta^3 - 9864s_ms_0^m n\beta^3 \\
& +20544s_ms_0^m \beta^3b^2 + 3840s_ms_0^m \beta^3b^4 + 19008s_mr_0^m \beta^3b^2 + 3456s_mr_0^m \beta^3b^4 + 12672r_ms_0^m \beta^3b^2 \\
& +2304r_ms_0^m \beta^3b^4 + 714r_0^2 + 864s_ms^m \beta^4 - 10088r_0r_0^m \beta^2 - 10088r_0|_m b^m \beta^2 + 10088r_0m|_0 b^m \beta^2 \\
& -2808s_ms_0^m \beta^2 - 11376s_0r_0^m \beta^3 - 11376s_{0|0} b^m \beta^3 + 5688s_m|_0 b^m \beta^3 + 45504s_{0|m}^m b^2 \beta^3 + 25344s_{0|m}^m b^4 \beta^3 \\
& +3072s_{0|m}^m \beta^3b^6 + 2484s_m^i s_m^i \beta^4 + 3744\beta^2b^4\sigma + 20880\beta^2b^4\theta + 768\beta^2b^6\sigma - 1473n\beta^2\sigma \\
& -6171n\beta^2\theta + 20712\beta^2b^2\theta + 4464\beta^2b^2\sigma + 6528\beta^2b^6\theta + 384\beta^2b^8\theta - 4464n\beta^2b^2\sigma)
\end{aligned}$$

$$\begin{aligned}
A_8 := & 2\beta(-3552n\beta^2b^6\theta + 1083\beta^2\theta - 1608n\beta^2b^4\sigma - 2064r_0s_0nb^2\beta - 2136r_0s_0n\beta b^4 + 1104r_0s_0nb\beta \\
& +2976r_0s_0nb^3\beta + 1824r_0s_0n\beta b^5 + 1488r_0r_0nb^2\beta + 912r_0r_0n\beta b^4 + 672r_0s_0b^4\beta + 2040r_0s_0b^2\beta \\
& -156r_0s_0n\beta + 2976r_0s_0b^5\beta + 1536r_0s_0b^3\beta - 1200r_0s_0b\beta - 912r_0r_0b^4\beta - 2712r_0r_0b^2\beta \\
& +552r_0r_0n\beta + 2976r_0r_0b^5\beta + 1536r_0r_0b^3\beta - 1200r_0r_0b\beta - 828r_{0|0}nb^2\beta - 1116r_{0|0}nb^4\beta \\
& -456r_{0|0}nb^6\beta + 5360s_0^2n\beta^2b^2 + 5168s_0^2n\beta^2b^4 + 6016s_0^2nb^3\beta^2 + 11200s_0^2nb^3\beta^2 + 4096s_0^2nb^5\beta^2 \\
& -3616rr_0b^2\beta^2 - 1216rr_0b^4\beta^2 + 8320rr_0b^2\beta^2 + 14464rr_0b^3\beta^2 + 4864rr_0b^5\beta^2 + 3008r_0s_0n\beta^2 \\
& -9840r_0s_0\beta^2b^2 - 5376r_0s_0\beta^2b^4 - 17920r_0s_0b\beta^2 - 22144r_0s_0b^3\beta^2 - 6016r_0s_0b^5\beta^2 - 9024r_0ms_0^m nb^2\beta^2 \\
& -8400r_0ms_0^m nb^4\beta^2 - 2048r_0ms_0^m n\beta^2b^6 - 4512s_{0|0}nb^2\beta^2 - 4200s_{0|0}nb^4\beta^2 - 1024s_{0|0}n\beta^2b^6 \\
& -2560rs_0\beta^3b^2 + 12352rs_0b\beta^3 + 10240rs_0\beta^3b^3 - 4776n\beta^2b^2\theta + 1024rs_0\beta^3b^5 - 256rs_0\beta^3b^4 \\
& +64\beta^2b^8\sigma - 7896s_ms_0^m n\beta^3b^2 - 3552s_ms_0^m n\beta^3b^4 - 6240r_0r_0^m b^2\beta^2 - 5424r_0r_0^m b^4\beta^2 \\
& -1216r_0r_0^m b^6\beta^2 - 6240r_{0|m} b^m b^2\beta^2 - 5424r_{0|m} b^m b^4\beta^2 - 1216r_{0|m} b^m b^6\beta^2 + 6240r_{0m|0} b^m b^2\beta^2 \\
& +5424r_{0m|0} b^m b^4\beta^2 + 1216r_{0m|0} b^m b^6\beta^2 - 2880s_ms_0^m b^2\beta^2 - 2304s_ms_0^m b^4\beta^2 - 9264s_0r_0^m \beta^3b^2 \\
& -3840s_0r_0^m \beta^3b^4 - 9264s_{0|m} b^m \beta^3b^2 - 3840s_{0|m} b^m \beta^3b^4 + 4632s_m|_0 b^m \beta^3b^2 + 1920s_m|_0 b^m \beta^3b^4 \\
& +3024s_m^i s_m^i \beta^4b^2 + 1756(\text{Ric} - \overline{\text{Ric}})\beta^2 + 1104r_0r_0nb\beta + 2976r_0r_0nb^3\beta + 1824r_0r_0n\beta b^5 \\
& +5600r_0s_0n\beta^2b^2 + 2048r_0s_0n\beta^2b^4 + 6016r_0s_0nb\beta^2 + 11200r_0s_0nb^3\beta^2 + 4096r_0s_0nb^5\beta^2 \\
& +7232(\text{Ric} - \overline{\text{Ric}})\beta^2b^6 + 1216(\text{Ric} - \overline{\text{Ric}})\beta^2b^8 + 8096(\text{Ric} - \overline{\text{Ric}})\beta^2b^2 + 12480(\text{Ric} - \overline{\text{Ric}})\beta^2b^4 \\
& -480n\beta^2b^8\theta - 64n\beta^2b^8\sigma - 704n\beta^2b^6\sigma + 292\beta^2\sigma + 384s_mr_0^m \beta^3b^6 + 336r_0^2b^4 - 6876n\beta^2b^4\theta \\
& +588r_0^2b^2 - 27r_0^2n + 198r_{0|0}\beta - 12176s_0^2\beta^2 + 2080r_0^2\beta^2 + 2024r_0mr_0^m \beta^2 + 1040r_0ms_0^m \beta^2 \\
& +3556s_{0|0}\beta^2 + 7368s_ms_0^m \beta^3 + 7500s_mr_0^m \beta^3 + 5000r_ms_0^m \beta^3 + 6316s_{0|m}^m \beta^3 - 36r_{0|0}\beta b^4 \\
& -144r_{0|0}b^6\beta - 2100r_0s_0\beta - 1560r_0r_0\beta - 192r_{0|0}n\beta + 360r_{0|0}\beta b^2 + 2448s_0^2n\beta^2 - 14208s_0^2\beta^2b^2 \\
& -8352s_0^2\beta^2b^4 - 10240s_0^2b\beta^2 - 5120s_0^2b^3\beta^2 + 2176s_0^2b^5\beta^2 - 2080rr_0\beta^2 + 3616r_0^2b^2\beta^2 + 1216r_0^2b^4\beta^2 \\
& -8320r_0^2b\beta^2 - 14464r_0^2b^3\beta^2 - 4864r_0^2b^5\beta^2 - 5168r_0s_0\beta^2 - 180r_0^2nb^2 - 216r_0^2nb^4 + 6240r_0mr_0^m b^2\beta^2 \\
& +5424r_0mr_0^m b^4\beta^2 + 1216r_0mr_0^m b^6\beta^2 + 192r_0ms_0^m b^2\beta^2 - 1344r_0ms_0^m b^4\beta^2 - 320r_0ms_0^m b^6\beta^2 \\
& -2776r_0ms_0^m n\beta^2 + 9456s_{0|0}b^2\beta^2 + 7464s_{0|0}b^4\beta^2 + 1664s_{0|0}b^6\beta^2 - 1388s_{0|0}n\beta^2 - 3088rs_0\beta^3 \\
& -3956s_ms_0^m n\beta^3 + 12792s_ms_0^m \beta^3b^2 + 5376s_ms_0^m \beta^3b^4 + 13896s_mr_0^m \beta^3b^2 + 5760s_mr_0^m \beta^3b^4 \\
& +9264r_ms_0^m \beta^3b^2 + 3840r_ms_0^m \beta^3b^4 + 39r_0^2 + 1512s_ms^m \beta^4 - 2024r_0r_0^m \beta^2 - 2024r_{0|m} b^m \beta^2 \\
& +2024r_{0m|0} b^m \beta^2 - 912s_ms_0^m \beta^2 - 5000s_0r_0^m \beta^3 - 5000s_{0|m} b^m \beta^3 + 2500s_m|_0 b^m \beta^3 + 20000s_{0|m}^m b^2 \beta^3 \\
& +18528s_{0|m}^m b^4 \beta^3 + 5120s_{0|m}^m \beta^3b^6 + 1944s_m^i s_m^i \beta^4 - 384s_ms_0^m \beta^2b^6 + 1608\beta^2b^4\sigma + 6876\beta^2b^4\theta \\
& +256s_{0|m}^m \beta^3b^8 - 1408s_0^2\beta^2b^6 + 704\beta^2b^6\sigma - 292n\beta^2\sigma - 1083n\beta^2\theta + 4776\beta^2b^2\theta \\
& +1220\beta^2b^2\sigma + 3552\beta^2b^6\theta + 512s_0^2\beta^2b^7 + 480\beta^2b^8\theta - 256s_0r_0^m \beta^3b^6 - 256s_{0|m} b^m \beta^3b^6 \\
& +128s_m|_0 b^m \beta^3b^6 - 1220n\beta^2b^2\sigma + 384s_ms_0^m b^6\beta^3 + 864s_ms^m b^2\beta^4 + 864s_m^i s_m^i \beta^4b^4 \\
& +1280s_0^2nb^6\beta^2 - 256s_ms_0^m n\beta^3b^6 - 640r_0s_0b^6\beta^2 + 256r_ms_0^m \beta^3b^6)
\end{aligned}$$

$$\begin{aligned}
A_9 := & 3744n\beta^2b^6\theta + 128s_ms_0^m b^8\beta^2 - 468\beta^2\theta + 1368n\beta^2b^4\sigma + 768r_{00}s_0nb^2\beta + 1056r_{00}s_0n\beta b^4 \\
& - 288r_{00}s_0nb\beta - 960r_{00}s_0nb^3\beta - 768r_{00}s_0nb\beta^5 - 480r_{00}r_0nb^2\beta - 384r_{00}r_0n\beta b^4 - 384r_{00}s_0b^4\beta \\
& - 1008r_{00}s_0b^2\beta + 48r_{00}s_0n\beta - 2304r_{00}s_0b^5\beta - 1152r_{00}s_0b^3\beta + 288r_{00}s_0b\beta + 384r_{00}r_0b^4\beta \\
& + 1008r_{00}r_0b^2\beta - 144r_{00}r_0n\beta - 2304r_{00}r_0b^5\beta - 1152r_{00}r_0b^3\beta + 288r_{00}r_0b\beta + 216r_{00|0}nb^2\beta \\
& + 360r_{00|0}nb^4\beta + 192r_{00|0}nb^6\beta - 5888s_0^2n\beta^2b^2 - 10288s_0^2n\beta^2b^4 - 3392s_0^2nb\beta^2 - 8576s_0^2nb^3\beta^2 \\
& - 4736s_0^2nb^5\beta^2 + 3136rr_{00}b^2\beta^2 + 1600rr_{00}b^4\beta^2 - 5248rr_{00}b\beta^2 - 12544rr_{00}b^3\beta^2 - 6400rr_{00}b^5\beta^2 \\
& - 1696r_0s_0n\beta^2 + 11744r_0s_0\beta^2b^2 + 11840r_0s_0\beta^2b^4 + 9792r_0s_0b\beta^2 + 12288r_0s_0b^3\beta^2 + 2688r_0s_0b^5\beta^2 \\
& + 5088r_0s_0^m nb^2\beta^2 + 6432r_0s_0^m nb^4\beta^2 + 2368r_0s_0^m n\beta^2b^6 + 2544s_0|0nb^2\beta^2 + 3216s_0|0nb^4\beta^2 \\
& + 1184s_0|0n\beta^2b^6 + 6528rs_0\beta^3b^2 - 18432rs_0b\beta^3 - 26112rs_0\beta^3b^3 + 2592n\beta^2b^2\theta - 6144rs_0\beta^3b^5 \\
& + 1536rs_0\beta^3b^4 - 192\beta^2b^8\sigma + 10560s_ms_0^m n\beta^3b^2 + 8160s_ms_0^m n\beta^3b^4 + 3936r_{00}r_m^m b^2\beta^2 + 4704r_{00}r_m^m b^4\beta^2 \\
& + 1600r_{00}r_m^m b^6\beta^2 + 3936r_{00|m}b^m b^2\beta^2 + 4704r_{00|m}b^m b^4\beta^2 + 1600r_{00|m}b^m b^6\beta^2 - 3936r_{0m|0}b^m b^2\beta^2 \\
& - 4704r_{0m|0}b^m b^4\beta^2 - 1600r_{0m|0}b^m b^6\beta^2 + 2944s_ms_0^m b^2\beta^2 + 4224s_ms_0^m b^4\beta^2 + 13824s_0r_m^m \beta^3b^2 \\
& + 9792s_0r_m^m \beta^3b^4 + 13824s_0|m b^m \beta^3b^2 + 9792s_0|m b^m \beta^3b^4 - 6912s_m|0b^m \beta^3b^2 - 4896s_m|0b^m \beta^3b^4 \\
& - 8352s_m^i s_i^m \beta^4b^2 - 700(\text{Ric} - \overline{\text{Ric}})\beta^2 - 288r_{00}r_0nb\beta - 960r_{00}r_0nb^3\beta - 768r_{00}r_0n\beta b^5 \\
& - 4288r_0s_0n\beta^2b^2 - 2368r_0s_0n\beta^2b^4 - 3392r_0s_0nb\beta^2 - 8576r_0s_0nb^3\beta^2 - 4736r_0s_0nb^5\beta^2 \\
& - 6272(\text{Ric} - \overline{\text{Ric}})\beta^2b^6 - 1600(\text{Ric} - \overline{\text{Ric}})\beta^2b^8 - 3968(\text{Ric} - \overline{\text{Ric}})\beta^2b^2 - 2b^4 + 864n\beta^2b^8\theta \\
& + 192n\beta^2b^8\sigma + 960n\beta^2b^6\sigma - 138\beta^2\sigma - 2304s_mr_0^m \beta^3b^6 - 72r_0^2b^4 + 4968n\beta^2b^4\theta - 96r_0^2b^2 + 3r_0^2n \\
& - 42r_{00|0}\beta + 10152s_0^2\beta^2 - 1312r_0^2\beta^2 - 992r_{0m}r_0^m \beta^2 - 288r_{0m}s_0^m \beta^2 - 1632s_0|0\beta^2 - 6656s_ms_0^m \beta^3 \\
& - 7632s_mr_0^m \beta^3 - 5088r_ms_0^m \beta^3 - 4800s_0|m \beta^3 + 168r_{00|0}\beta b^4 + 192r_{00|0}b^6\beta + 816r_{00}s_0\beta + 480r_{00}r_0\beta \\
& + 42r_{00|0}n\beta - 48r_{00|0}\beta 7872(\text{Ric} - \overline{\text{Ric}})\beta b^2 - 1704s_0^2n\beta^2 + 17600s_0^2\beta^2b^2 + 18016s_0^2\beta^2b^4 + 4672s_0^2b\beta^2 \\
& - 4608s_0^2b^3\beta^2 - 11904s_0^2b^5\beta^2 + 1312rr_{00}\beta^2 - 3136r_0^2b^2\beta^2 - 1600r_0^2b^4\beta^2 + 5248r_0^2b\beta^2 + 12544r_0^2b^3\beta^2 \\
& + 6400r_0^2b^5\beta^2 + 4032r_0s_0\beta^2 + 24r_0^2nb^2 + 36r_0^2nb^4 - 3936r_{0m}r_0^m b^2\beta^2 - 4704r_{0m}r_0^m b^4\beta^2 \\
& - 1600r_{0m}r_0^m b^6\beta^2 + 1440r_{0m}s_0^m b^2\beta^2 + 4032r_{0m}s_0^m b^4\beta^2 + 1728r_{0m}s_0^m b^6\beta^2 + 1232r_{0m}s_0^m n\beta^2 \\
& - 5184s_0|0b^2\beta^2 - 5040s_0|0b^4\beta^2 - 1536s_0|0b^6\beta^2 + 616s_0|0n\beta^2 + 4608rs_0\beta^3 + 3632s_ms_0^m n\beta^3 \\
& - 15552s_ms_0^m \beta^3b^2 - 10560s_ms_0^m \beta^3b^4 - 20736s_mr_0^m \beta^3b^2 - 14688s_mr_0^m \beta^3b^4 - 13824r_ms_0^m \beta^3b^2 \\
& - 3r_0^2 - 4176s_ms_0^m \beta^4 + 992r_{00}r_m^m \beta^2 + 992r_{00|m}b^m \beta^2 - 992r_{0m|0}b^m \beta^2 + 632s_ms_0^m \beta^2 + 5088s_0r_m^m \beta^3 \\
& + 5088s_0|m b^m \beta^3 - 2544s_m|0b^m \beta^3 - 20352s_m^i s_i^m b^2\beta^3 - 27648s_m^i s_i^m b^4\beta^3 - 13056s_m^i s_i^m \beta^3b^6 - 3228s_m^i s_i^m \beta^4 \\
& + 1792s_ms_0^m \beta^2b^6 - 768s_m^i s_i^m \beta^4b^6 - 1368\beta^2b^4\sigma - 4968\beta^2b^4\theta - 1536s_0|m \beta^3b^8 + 512s_0^2b^8\beta^2 \\
& + 6784s_0^2\beta^2b^6 - 960\beta^2b^6\sigma + 138n\beta^2\sigma + 468n\beta^2\theta - 2592\beta^2b^2\theta - 744\beta^2b^2\sigma - 3744\beta^2b^6\theta \\
& - 2560s_0^2\beta^2b^7 - 864\beta^2b^8\theta + 1536s_0r_m^m \beta^3b^6 + 1536s_0|m b^m \beta^3b^6 - 768s_m|0b^m \beta^3b^6 + 744n\beta^2b^2\sigma \\
& - 1792s_ms_0^m b^6\beta^3 - 5472s_ms_0^m b^2\beta^4 - 5472s_m^i s_i^m \beta^4b^4 - 1152s_ms_0^m \beta^4b^4 - 6016s_0^2nb^6\beta^2 \\
& + 1408s_ms_0^m n\beta^3b^6 + 3200r_0s_0b^6\beta^2 - 1536r_ms_0^m \beta^3b^6 - 512s_0^2nb^8\beta^2 - 9792r_ms_0^m \beta^3b^4
\end{aligned}$$

$$\begin{aligned}
A_{10} := & -256s_ms_0^m b^8\beta + 128s_m^i s_i^m b^8\beta^3 + 256s_ms_0^m \beta^3b^6 + 2176s_m^i s_i^m \beta^3b^6 + 3264s_ms_0^m \beta^3b^4 - 64r_{00}s_0nb^2 \\
& - 112r_{00}s_0nb^4 + 64r_{00}s_0nb^3 + 64r_{00}s_0nb^5 + 16r_{00}s_0nb + 32r_{00}r_0nb^2 + 32r_{00}r_0nb^4 + 64r_{00}r_0nb^3 \\
& + 64r_{00}r_0nb^5 + 16r_{00}r_0nb + 1440s_0^2n\beta b^2 + 3904s_0^2n\beta b^4 + 4352s_0^2n\beta b^6 + 512s_0^2nb\beta + 1664s_0^2nb^3\beta \\
& + 1280s_0^2nb^5\beta - 704rr_{00}b^2\beta - 512rr_{00}b^4\beta + 896rr_{00}b\beta + 2816rr_{00}b^3\beta + 2048rr_{00}b^5\beta + 256r_0s_0n\beta \\
& - 3168r_0s_0\beta b^2 - 4992r_0s_0\beta b^4 - 1280r_0s_0\beta b^3 - 1472r_0s_0b\beta - 2560r_0s_0\beta b^6 + 1024r_0s_0\beta b^5 \\
& - 768r_{0m}s_0^m nb^2\beta - 1248r_{0m}s_0^m nb^4\beta - 640r_{0m}s_0^m nb^6\beta - 384s_0|0nb^2\beta - 624s_0|0nb^4\beta \\
& - 320s_0|0nb^6\beta + 7424rs_0b\beta^2 + 15872rs_0b^3\beta^2 - 1664rs_0b^4\beta^2 + 6656rs_0b^5\beta^2 - 3744s_ms_0^m n\beta^2b^2 \\
& - 4320s_ms_0^m n\beta^2b^4 - 1344s_ms_0^m nb^6\beta^2 - 3968rs_0b^2\beta^2 - 672r_{00}r_m^m b^2\beta - 1056r_{00}r_m^m b^4\beta \\
& - 512r_{00}r_m^m b^6\beta - 672r_{00|m}b^m b^2\beta - 1056r_{00|m}b^m b^4\beta - 512r_{00|m}b^m b^6\beta + 672r_{0m|0}b^m b^2\beta \\
& + 1056r_{0m|0}b^m b^4\beta + 512r_{0m|0}b^m b^6\beta - 704s_ms_0^m \beta b^2 - 1536s_ms_0^m \beta b^4 - 1280s_ms_0^m \beta b^6 - 5568s_0r_m^m b^2\beta^2
\end{aligned}$$

$$\begin{aligned}
& -5952s_0r_m^m\beta^2b^4 - 1664s_0r_m^m\beta^2b^6 - 5568s_{0|m}b^mb^2\beta^2 - 5952s_{0|m}b^m\beta^2b^4 - 1664s_{0|m}b^m\beta^2b^6 \\
& + 2784s_{m|0}b^mb^2\beta^2 + 2976s_{m|0}b^m\beta^2b^4 + 832s_{m|0}b^m\beta^2b^6 + 6528s_ms^m\beta^3b^2 + 5824s_m^i s_m^i \beta^3b^2 \\
& + 6528s_m^i s_m^i \beta^3b^4 + 1112s_{0|m}^m\beta^2 + 80(\text{Ric} - \overline{\text{Ric}})\beta + 832r_0s_0n\beta b^2 + 640r_0s_0n\beta b^4 + 512r_0s_0n\beta b \\
& + 1664r_0s_0n\beta^3 + 1280r_0s_0n\beta^5 + 1408(\text{Ric} - \overline{\text{Ric}})\beta b^6 + 512(\text{Ric} - \overline{\text{Ric}})\beta b^8 + 544(\text{Ric} - \overline{\text{Ric}})\beta b^2 \\
& + 1344(\text{Ric} - \overline{\text{Ric}})\beta b^4 - 68r_0s_0 - 32r_0r_0 - 24r_{00|0}b^4 - 2r_{00|0}n - 32r_{00|0}b^6 - 2200s_0^2\beta + 224r_0^2\beta \\
& + 136r_0mr_0^m\beta + 16r_0ms_0^m\beta + 212s_{0|0}\beta + 1760s_ms_0^m\beta^2 + 2256s_mr_0^m\beta^2 + 1504r_ms_0^m\beta^2 \\
& + 64r_0s_0b^4 + 112r_0s_0b^2 - 4r_0s_0n + 320r_0s_0b^5 + 128r_0s_0b^3 - 16r_0s_0b - 32r_0r_0b^4 - 80r_0r_0b^2 \\
& + 8r_0r_0n + 320r_0r_0b^5 + 128r_0r_0b^3 - 16r_0r_0b - 12r_{00|0}nb^2 - 24r_{00|0}nb^4 - 16r_{00|0}nb^6 + 296s_0^2n\beta \\
& - 4928s_0^2\beta b^2 - 7680s_0^2\beta b^4 + 2048s_0^2\beta b^7 + 2816s_0^2\beta b^3 - 576s_0^2\beta b - 5120s_0^2\beta b^6 + 6656s_0^2\beta b^5 \\
& - 224rr_0\beta + 704r_0^2b^2\beta + 512r_0^2b^4\beta - 896r_0^2b\beta - 2816r_0^2b^3\beta - 2048r_0^2b^5\beta - 800r_0s_0\beta + 672r_0mr_0^m\beta^2 \\
& + 1056r_0mr_0^m\beta^4 + 512r_0mr_0^m\beta^6 - 480r_0ms_0^m\beta b^2 - 1536r_0ms_0^m\beta b^4 - 1024r_0ms_0^m\beta b^6 \\
& - 152r_0ms_0^m\beta b^8 + 768s_{0|0}\beta b^2 + 816s_{0|0}\beta b^4 + 256s_{0|0}\beta b^6 - 76s_{0|0}n\beta - 1856r_0\beta^2 - 960s_ms_0^m\beta n\beta^2 \\
& + 4896s_ms_0^m\beta^2b^2 + 4224s_ms_0^m\beta^2b^4 + 1216s_ms_0^m\beta^2b^6 + 8352s_mr_0^m\beta^2b^2 + 8928s_mr_0^m\beta^2b^4 \\
& + 2496s_mr_0^m\beta^2b^6 + 5568r_ms_0^m\beta^2b^2 + 5952r_ms_0^m\beta^2b^4 + 1664r_ms_0^m\beta^2b^6 + 57\beta\theta + 18\beta\sigma + 2r_{00|0} \\
& + 2912s_ms^m\beta^3 - 136r_0r_0^m\beta - 136r_{00|m}b^m\beta + 136r_{0m|0}b^m\beta - 112s_ms_0^m\beta - 1504s_0r_m^m\beta^2 \\
& - 1504s_{0|m}b^m\beta^2 + 752s_{m|0}b^m\beta^2 + 6016s_{0|m}^m\beta^2b^2 + 11136s_{0|m}^m\beta^2b^4 + 7936s_{0|m}^m\beta^2b^6 + 1664s_{0|m}^m\beta^2b^8 \\
& + 1544s_m^i s_m^i \beta^3 + 1024s_0^2nb^8\beta - 384n\beta b^2\theta - 120n\beta b^2\sigma - 936n\beta b^4\theta - 288n\beta b^4\sigma - 960n\beta b^6\theta \\
& - 288n\beta b^6\sigma - 336n\beta b^8\theta - 96n\beta b^8\sigma - 57n\beta\theta - 18n\beta\sigma + 384\beta b^2\theta + 120\beta b^2\sigma + 936\beta b^4\theta \\
& + 288\beta b^4\sigma + 960\beta b^6\theta + 288\beta b^6\sigma + 336\beta b^8\theta + 96\beta b^8\sigma - 1024s_0^2b^8\beta
\end{aligned}$$

$$\begin{aligned}
A_{11} := & -4(\text{Ric} - \overline{\text{Ric}}) + 24nb^4\sigma + 32nb^6\sigma + 8nb^2\sigma + 48nb^8\theta + 16nb^8\sigma + 96nb^6\theta + 72nb^4\theta - 64r_0s_0nb^2 \\
& - 64r_0s_0nb^4 - 128r_0s_0nb^3 - 128r_0s_0nb^5 - 32r_0s_0nb + 1152r_0s_0\beta b^2 + 768r_0s_0\beta b^4 - 320s_m^i s_m^i b^8\beta^2 \\
& - 640s_ms^m\beta^2b^6 - 3072r_0s_0\beta b^5 - 4608r_0s_0\beta b^3 - 1536r_0s_0\beta b - 672s_ms_0^m\beta n\beta b^2 + 1056s_ms_0^m\beta n\beta b^4 \\
& + 512s_ms_0^m\beta n\beta b^6 + 1152s_0r_m^m\beta b^2 + 1728s_0r_m^m\beta b^4 + 768s_0r_m^m\beta b^6 + 1152s_{0|m}b^m\beta b^2 + 1728s_{0|m}b^m\beta b^4 \\
& + 768s_{0|m}b^m\beta b^6 - 576s_{m|0}b^m\beta b^2 - 864s_{m|0}b^m\beta b^4 - 384s_{m|0}b^m\beta b^6 - 3648s_ms^m\beta b^2 - 3264s_ms^m\beta b^4 \\
& - 2176s_m^i s_m^i \beta^2b^2 - 3648s_m^i s_m^i \beta^2b^4 - 2176s_m^i s_m^i \beta^2b^6 - 128(\text{Ric} - \overline{\text{Ric}})b^6 - 64(\text{Ric} - \overline{\text{Ric}})b^8 \\
& - 32(\text{Ric} - \overline{\text{Ric}})b^2 - 96(\text{Ric} - \overline{\text{Ric}})b^4 + 24nb^2\theta + 512s_0^2b^2 + 1120s_0^2b^4 - 20s_0^2n + 1152s_0^2b^6 \\
& - 384s_0^2b^3 - 1152s_0^2b^5 - 512s_0^2b^7 + 32s_0^2b + 512s_0^2b^8 - 64r_0^2b^2 - 64r_0^2b^4 + 64r_0^2b + 256r_0^2b^3 + 256r_0^2b^5 \\
& + 64r_0s_0 - 48r_0mr_0^m\beta^2 - 96r_0mr_0^m\beta^4 - 64r_0mr_0^m\beta^6 + 48r_0ms_0^m\beta^2 + 192r_0ms_0^m\beta^4 + 8s_ms_0^m \\
& + 192r_0ms_0^m\beta^6 + 8r_0ms_0^m\beta n - 48s_{0|0}b^2 - 48s_{0|0}b^4 + 4s_{0|0}n - 256s_ms_0^m\beta - 360s_mr_0^m\beta - 240r_ms_0^m\beta \\
& - 144s_{0|m}^m\beta - 3\theta - \sigma - 8r_0mr_0^m - 128s_0^2nb^2 - 496s_0^2nb^4 - 896s_0^2nb^6 - 128s_0^2nb^8 - 128s_0^2nb^5 \\
& + 64rr_0b^2 + 64rr_0b^4 - 64rr_0b - 256rr_0b^3 - 256rr_0b^5 + 320r_0s_0b^2 + 704r_0s_0b^4 - 16r_0s_0n \\
& + 96r_0s_0b + 48r_0ms_0^m\beta b^2 + 96r_0ms_0^m\beta b^4 + 64r_0ms_0^m\beta b^6 + 24s_{0|0}nb^2 + 48s_{0|0}nb^4 + 32s_{0|0}nb^6 \\
& + 136s_ms_0^m\beta n\beta - 768s_ms_0^m\beta b^2 - 576s_ms_0^m\beta b^4 - 128s_ms_0^m\beta b^6 - 1728s_mr_0^m\beta b^2 - 2592s_mr_0^m\beta b^4 \\
& - 1152s_mr_0^m\beta b^6 - 1152r_ms_0^m\beta b^2 - 1728r_ms_0^m\beta b^4 - 768r_ms_0^m\beta b^6 - 1088s_ms^m\beta^2 + 48r_0r_m^m\beta^2 \\
& + 96r_0r_m^m\beta^4 + 64r_0r_m^m\beta^6 + 48r_{00|m}b^m\beta^2 + 96r_{00|m}b^m\beta^4 + 64r_{00|m}b^m\beta^6 - 48r_{0m|0}b^m\beta^2 - 96r_{0m|0}b^m\beta^4 \\
& - 64r_{0m|0}b^m\beta^6 + 192s_ms_0^m\beta^4 + 64s_ms_0^m\beta^2 + 256s_ms_0^m\beta^6 + 128s_ms_0^m\beta^8 + 240s_0r_m^m\beta + 240s_{0|m}b^m\beta \\
& - 120s_{m|0}b^m\beta - 960s_{0|m}^m\beta b^2 - 8b^2\sigma - 72b^4\theta - 24b^4\sigma - 96b^6\theta - 32b^6\sigma - 48b^8\theta - 16b^8\sigma + 16rr_0 \\
& + 8r_0r_m^m + 8r_{00|m}b^m - 8r_{0m|0}b^m + 196s_0^2 - 16r_0^2 - 12s_{0|0} - 2304s_{0|m}^m\beta b^4 - 2304s_{0|m}^m\beta b^6 - 768s_{0|m}^m\beta b^8 \\
& - 428s_m^i s_m^i \beta^2 + 3n\theta - 24b^2\theta + n\sigma - 32s_0^2nb - 512s_0^2nb^8 + 640r_0s_0b^6 - 384r_0s_0b^5 + 384r_0s_0\beta,
\end{aligned}$$

$$\begin{aligned}
A_{12} := & 8(1 + 2b^2)^2(8s_m^i s_m^i \beta b^4 + 4s_{0|m}^m\beta b^4 - 2s_ms_0^m\beta b^2 - 4s_{0|m}b^m\beta b^2 + 6s_mr_0^m\beta b^2 + 16s_ms^m\beta b^2 + 4s_{0|m}^m\beta b^2 \\
& + 4r_ms_0^m\beta b^2 + 20s_m^i s_m^i \beta b^2 - 4s_0r_m^m\beta b^2 - 2s_ms_0^m\beta b^2 + 2s_{m|0}b^m\beta b^2 + 16r_0s_0b + 3s_mr_0^m + 2r_ms_0^m
\end{aligned}$$



$$\begin{aligned}
& +s_{0|m}^m - 4r_{s_0} - 2s_{0|m}r_m^m - 2s_{0|m}b^m + 8s_m^i s_i^m \beta + 26s_m s^m \beta - s_m s_0^m n + s_{m|0} b^m + 2s_m s_0^m), \\
A_{13} := & -4(1+2b^2)^3(2s_m^i s_i^m b^2 + s_m^i s_i^m + 4s_m s^m).
\end{aligned}$$

## 12. APPENDIX 7: COEFFICIENTS IN (16)

$$\begin{aligned}
A'_0 & := 24\beta^9(108(\text{Ric} - \overline{\text{Ric}})) \\
A'_2 & := -288\beta^9 c^2(-11 + 8n) + 24\beta^7(-144c_0 n b^2 \beta + 192c s_0 n b \beta - 384c^2 b \beta^2 + 192c^2 n b \beta - 96c s_0 n \beta \\
& - 342c_0 n \beta + 192c_0 \beta b^2 + 120c s_0 \beta - 144c^2 \beta^2 + 96c^2 n \beta^2 - 384c s_0 b \beta + 492c_0 \beta) + 2\beta^5(3726\beta^2 \theta \\
& - 2592n\beta^2 b^2 \theta + 1728c_0 b^2 \beta^3 + 13068(\text{Ric} - \overline{\text{Ric}})\beta^2 + 2304c s_0 n b \beta^3 + 15552(\text{Ric} - \overline{\text{Ric}})\beta^2 b^2 \\
& + 3456(\text{Ric} - \overline{\text{Ric}})\beta^2 b^4 + 324\beta^2 \sigma + 144s_0^2 \beta^2 + 576c^2 \beta^4 + 9144s_{0|0} \beta^2 + 1296s_{0|m}^m \beta^3 - 6912s_0^2 b \beta^2 \\
& - 2304c^2 b \beta^4 + 288c s_0 \beta^3 + 4032s_{0|0} b^2 \beta^2 - 3672s_{0|0} n \beta^2 + 3888c_0 \beta^3 \\
& - 324n\beta^2 \sigma - 3726n\beta^2 \theta + 2592\beta^2 b^2 \theta) \\
A'_4 & := 24\beta^7(1144c^2 + 928c^2 b^2 + 64c^2 b^4 - 865c^2 n - 64c^2 n b^4 - 712c^2 n b^2) + \beta^3(-2304n\beta^2 b^6 \theta + 11061\beta^2 \theta \\
& - 1728n\beta^2 b^4 \sigma + 1216s_0^2 n \beta^2 b^2 - 512s_0^2 n \beta^2 b^4 + 28928s_0^2 n b \beta^2 + 22016s_0^2 n b^3 \beta^2 + 2048s_0^2 n b^5 \beta^2 \\
& + 14464c s_0 n \beta^3 - 1344c s_0 \beta^3 b^2 + 768c s_0 \beta^3 b^4 - 94016c s_0 b \beta^3 - 60416c s_0 b^3 \beta^2 - 5120c \beta s_0 b^5 \beta^2 \\
& - 21696s_{0|0} n b^2 \beta^3 - 8256s_{0|0} n b^4 \beta^2 - 512s_{0|0} n \beta^2 b^6 + 4608c b^2 s_0 b \beta^3 - 26352n \beta^2 b^2 \theta - 3456s_m s_0^m n \beta^3 b^2 \\
& + 24864c_0 b^2 \beta^3 + 8832c_0 b^4 \beta^3 + 512c_0 b^6 \beta^3 - 1728s_m s_0^m b^2 \beta^2 - 3456s_0 c n \beta^3 b^2 - 3456s_{0|m} b^m \beta^3 b^2 \\
& + 1728s_{m|0} b^m \beta^3 b^2 + 22976(\text{Ric} - \overline{\text{Ric}})\beta^2 + 11008c s_0 n \beta^3 b^2 + 1024c s_0 n \beta^3 b^4 + 28928c s_0 n b \beta^3 \\
& + 22016c s_0 n b^3 \beta^3 + 2048c s_0 n b^5 \beta^3 + 11776(\text{Ric} - \overline{\text{Ric}})\beta^2 b^6 + 512(\text{Ric} - \overline{\text{Ric}})\beta^2 b^8 \\
& + 62752(\text{Ric} - \overline{\text{Ric}})\beta^2 b^2 + 49728(\text{Ric} - \overline{\text{Ric}})\beta^2 b^4 + 2214\beta^2 \sigma - 16416n\beta^2 b^4 \theta - 20616s_0^2 \beta^2 \\
& + 8288c^2 \beta^4 + 31988s_{0|0} \beta^2 + 12672s_m s_0^m \beta^3 + 10368c s_0 \beta^3 + 6912c s_0 \beta^3 + 20520s_{0|m}^m \beta^3 + 5560s_0^2 n \beta^2 \\
& - 2112s_0^2 \beta^2 b^2 + 768s_0^2 \beta^2 b^4 - 69568s_0^2 b \beta^2 - 43264s_0^2 b^3 \beta^2 - 4096s_0^2 b^5 \beta^2 + 5888c^2 b^2 \beta^4 \\
& + 512c^2 b^4 \beta^4 - 33152c^2 b \beta^4 - 23552c^2 b^3 \beta^4 - 2048c^2 b^5 \beta^4 - 8640c s_0 \beta^3 + 48288s_{0|0} b^2 \beta^2 \\
& + 17088s_{0|0} b^4 \beta^2 + 1024s_{0|0} b^6 \beta^2 - 12844s_{0|0} n \beta^2 - 1152c b^2 s_0 \beta^3 - 6480s_m s_0^m n \beta^3 + 6336s_m s_0^m \beta^3 b^2 \\
& + 5184c s_0 \beta^3 b^2 + 3456c s_0 \beta^3 b^2 + 15688c_0 \beta^3 - 2160s_m s_0^m \beta^2 - 6912s_0 c n \beta^3 - 6912s_{0|m} b^m \beta^3 \\
& + 3456s_{m|0} b^m \beta^3 + 27648s_{0|m}^m b^2 \beta^3 + 6912s_{0|m}^m b^4 \beta^3 + 648s_m^i s_i^m \beta^4 + 1728\beta^2 b^4 \sigma \\
& + 16416\beta^2 b^4 \theta - 2214n\beta^2 \sigma - 11061n\beta^2 \theta + 26352\beta^2 b^2 \theta + 4320\beta^2 b^2 \sigma + 2304\beta^2 b^6 \theta - 4320n\beta^2 b^2 \sigma) \\
& + 2\beta^5(-8896c s_0 n b^2 \beta - 1024c s_0 n \beta b^4 + 18976c s_0 n b \beta + 12544c s_0 n b^3 \beta + 1024c s_0 n \beta b^5 + 6272c^2 n b^2 \beta^2 \\
& + 512c^2 n \beta^2 b^4 + 1024c s_0 b^4 \beta + 10432c s_0 b^2 \beta - 6568c s_0 n \beta - 1024c s_0 b^5 \beta - 15616c s_0 b^3 \beta - 32608c s_0 b \beta \\
& - 512c^2 b^4 \beta^2 - 8192c^2 b^2 \beta^2 + 9488c^2 n \beta^2 - 1024c^2 b^5 \beta^2 - 15616c^2 b^3 \beta^2 - 32608c^2 b \beta^2 - 14232c_0 n b^2 \beta \\
& - 4704c_0 n b^4 \beta - 256c_0 n b^6 \beta + 2304s_0^2 n b \beta^2 + 2304c^2 b^3 \beta^2 + 1152c s_0 n \beta^3 - 8064c s_0 b \beta^3 - 1728s_{0|0} n b^2 \beta^2 \\
& - 1728c^2 n b^2 \beta^2 - 1728c_m b^m b^2 \beta^2 + 18976c^2 n b \beta^2 + 12544c^2 n b^3 \beta^2 + 1024c^2 n \beta^2 b^5 + 12584c_0 \beta \\
& + 3888c^2 \beta^2 + 4800c_0 \beta b^4 + 256c_0 b^6 \beta + 640c s_0 \beta - 16496c^2 \beta^2 - 9698c_0 n \beta + 15840c_0 \beta b^2 - 576c^2 b^2 \beta^2 \\
& + 1728c^2 b^2 \beta^2 - 3888c^2 n \beta^2 - 3888c_m b^m \beta^2 - 3888c^2 n \beta^2 - 3888c_m b^m \beta^2) \\
A'_6 & := 2\beta(-3552n\beta^2 b^6 \theta + 1083\beta^2 \theta - 1608n\beta^2 b^4 \sigma + 5360s_0^2 n \beta^2 b^2 + 5168s_0^2 n \beta^2 b^4 + 6016s_0^2 n b \beta^2 \\
& + 11200s_0^2 n b^3 \beta^2 + 4096s_0^2 n b^5 \beta^2 + 3008c s_0 n \beta^3 - 9840c s_0 \beta^3 b^2 - 5376c s_0 \beta^3 b^4 - 17920c s_0 b \beta^3 \\
& - 22144c s_0 \beta^3 \beta^3 - 6016c s_0 b^5 \beta^3 - 4512s_{0|0} n b^2 \beta^2 - 4200s_{0|0} n b^4 \beta^2 - 1024s_{0|0} n \beta^2 b^6 - 2560c b^4 s_0 \beta^3 \\
& + 12352c b^2 s_0 b \beta^3 + 10240c s_0 \beta^3 b^5 - 4776n\beta^2 b^2 \theta + 1024c s_0 \beta^3 b^7 - 256c s_0 \beta^3 b^6 + 64\beta^2 b^8 \sigma \\
& - 7896s_m s_0^m n \beta^3 b^2 - 3552s_m s_0^m n \beta^3 b^4 + 6240c_0 b^2 \beta^3 + 5424c_0 b^4 \beta^3 + 1216c_0 b^6 \beta^3 - 2880s_m s_0^m b^2 \beta^2 \\
& - 2304s_m s_0^m b^4 \beta^2 - 9264s_0 c n \beta^3 b^2 - 3840s_0 c n \beta^3 b^4 - 9264s_{0|m} b^m \beta^3 b^2 - 3840s_{0|m} b^m \beta^3 b^4 \\
& + 4632s_{m|0} b^m \beta^3 b^2 + 1920s_{m|0} b^m \beta^3 b^4 + 3024s_m^i s_i^m \beta^4 b^2 + 1756(\text{Ric} - \overline{\text{Ric}})\beta^2 + 5600c s_0 n \beta^3 b^2
\end{aligned}$$

$$\begin{aligned}
& +2048cs_0n\beta^3b^4 + 6016cs_0nb\beta^3 + 11200cs_0nb^3\beta^3 + 4096cs_0nb^5\beta^3 + 7232(\text{Ric} - \overline{\text{Ric}})\beta^2b^6 \\
& +1216(\text{Ric} - \overline{\text{Ric}})\beta^2b^8 + 8096(\text{Ric} - \overline{\text{Ric}})\beta^2b^2 + 12480(\text{Ric} - \overline{\text{Ric}})\beta^2b^4 - 480n\beta^2b^8\theta \\
& -64n\beta^2b^8\sigma - 704n\beta^2b^6\sigma + 292\beta^2\sigma + 384cs_0\beta^3b^6 - 6876n\beta^2b^4\theta - 12176s_0^2\beta^2 + 2080c^2\beta^4 \\
& +3556s_{0|0}\beta^2 + 7368s_ms_m^m\beta^3 + 7500cs_0\beta^3 + 5000cs_0\beta^3 + 6316s_{0|m}^m\beta^3 + 2448s_0^2n\beta^2 \\
& -14208s_0^2\beta^2b^2 - 8352s_0^2\beta^2b^4 - 10240s_0^2b\beta^2 - 5120s_0^2b^3\beta^2 + 2176s_0^2b^5\beta^2 + 3616c^2b^2\beta^4 \\
& +1216c^2b^4\beta^4 - 8320c^2b\beta^4 - 14464c^2b^3\beta^4 - 4864c^2b^5\beta^4 - 5168cs_0\beta^3 + 9456s_{0|0}b^2\beta^2 + 7464s_{0|0}b^4\beta^2 \\
& +1664s_{0|0}b^6\beta^2 - 1388s_{0|0}n\beta^2 - 3088cb^2s_0\beta^3 - 3956s_ms_m^m n\beta^3 + 12792s_ms_m^m\beta^3b^2 + 5376s_ms_m^m\beta^3b^4 \\
& +13896cs_0\beta^3b^2 + 5760cs_0\beta^3b^4 + 9264cs_0\beta^3b^2 + 3840cs_0\beta^3b^4 + 1512s_ms_m^m\beta^4 + 2024c_0\beta^3 \\
& -912s_ms_m^m\beta^2 - 5000s_0cn\beta^3 - 5000s_{0|m}b^m\beta^3 + 2500s_{m|0}b^m\beta^3 + 20000s_{0|m}^m b^2\beta^3 + 18528s_{0|m}^m b^4\beta^3 \\
& + 5120s_{0|m}^m\beta^3b^6 + 1944s_m^i s_i^m\beta^4 - 384s_ms_m^m\beta^2b^6 + 1608\beta^2b^4\sigma + 6876\beta^2b^4\theta + 256s_{0|m}^m\beta^3b^8 \\
& -1408s_0^2\beta^2b^6 + 704\beta^2b^6\sigma - 292n\beta^2\sigma - 1083n\beta^2\theta + 4776\beta^2b^2\theta + 1220\beta^2b^2\sigma \\
& +3552\beta^2b^6\theta + 512s_0^2\beta^2b^7 + 480\beta^2b^8\theta - 256s_0cn\beta^3b^6 - 256s_{0|m}b^m\beta^3b^6 + 128s_{m|0}b^m\beta^3b^6 \\
& -1220n\beta^2b^2\sigma + 384s_ms_m^m b^6\beta^3 + 864s_ms_m^m b^2\beta^4 + 864s_m^i s_i^m\beta^4b^4 + 1280s_0^2nb^6\beta^2 - 256s_ms_m^m n\beta^3b^6 \\
& -640cs_0b^6\beta^3 + 256cs_0\beta^3b^6) + \beta^3(-24672cs_0nb^2\beta - 11712cs_0nb^4 + 24336cs_0nb\beta + 38016cs_0nb^3\beta \\
& +11520cs_0nb^5 + 19008c^2nb^2\beta^2 + 5760c^2n\beta^2b^4 + 6912cs_0b^4\beta + 21600cs_0b^2\beta - 4980cs_0n\beta - 768cs_0b^5\beta \\
& -20352cs_0b^3\beta - 33744cs_0b\beta - 5760c^2b^4\beta^2 - 28224c^2b^2\beta^2 + 12168c^2n\beta^2 - 768c^2b^5\beta^2 - 20352c^2b^3\beta^2 \\
& -33744c^2b\beta^2 - 18252c_0nb^2\beta - 14256c_0nb^4\beta - 2880c_0nb^6\beta - 5888c^2b^4\beta^2 - 512c^2b^6\beta^2 + 33152c^2b^3\beta^2 \\
& + 23552c^2b^5\beta^2 + 2048c^2b^7\beta^2 - 24864c^2nb^2\beta^2 - 8832c^2nb^4\beta^2 - 512c^2nb^6\beta^2 - 24864c_m b^m b^2\beta^2 \\
& -8832c_m b^m b^4\beta^2 - 512c_m b^m b^6\beta^2 + 24336c^2nb^2\beta^2 + 38016c^2nb^3\beta^2 + 11520c^2n\beta^2b^5 + 7554c_0\beta \\
& +15688c^2\beta^2 + 8640c_0\beta b^4 + 1536c_0b^6\beta - 18036cs_0\beta - 26064c^2\beta^2 - 6570c_0n\beta + 14832c_0\beta b^2 \\
& -8288cb^2c\beta^2 + 24864c^2b^2\beta^2 + 8832c^2b^4\beta^2 + 512c^2b^6\beta^2 - 15688c^2n\beta^2 - 15688c_m b^m\beta^2) \\
& +2\beta^5(5280c^2b^4 + 25296c^2b^2 - 8049c^2n - 17112c^2nb^2 - 5808c^2nb^4 + 11085c^2)
\end{aligned}$$

$$\begin{aligned}
A'_8 := & -256s_ms_m^m b^8\beta + 128s_m^i s_i^m b^8\beta^3 + 256s_ms_m^m\beta^3b^6 + 2176s_m^i s_i^m\beta^3b^6 + 3264s_ms_m^m\beta^3b^4 + 1440s_0^2n\beta b^2 \\
& +3904s_0^2nb^4 + 4352s_0^2nb^6 + 512s_0^2nb\beta + 1664s_0^2nb^3\beta + 1280s_0^2nb^5\beta + 256cs_0n\beta^2 - 3168cs_0\beta^2b^2 \\
& -4992cs_0\beta^2b^4 - 1280cs_0\beta^2b^3 - 1472cs_0b\beta^2 - 2560cs_0\beta^2b^6 + 1024cs_0\beta^2b^5 - 384s_{0|0}nb^2\beta \\
& -624s_{0|0}nb^4\beta - 320s_{0|0}nb^6\beta + 7424cb^3s_0\beta^2 + 15872cs_0b^5\beta^2 - 1664cb^6s_0\beta^2 + 6656cb^7s_0\beta^2 \\
& -3744s_ms_m^m n\beta^2b^2 - 4320s_ms_m^m n\beta^2b^4 - 1344s_ms_m^m nb^6\beta^2 - 3968cs_0b^4\beta^2 + 672c_0b^2\beta^2 \\
& +1056c_0b^4\beta^2 + 512c_0b^6\beta^2 - 704s_ms_m^m\beta b^2 - 1536s_ms_m^m\beta b^4 - 1280s_ms_m^m\beta b^6 - 5568s_0cnb^2\beta^2 \\
& -5952s_0cn\beta^2b^4 - 1664s_0cn\beta^2b^6 - 5568s_{0|m}b^m\beta^2b^2 - 5952s_{0|m}b^m\beta^2b^4 - 1664s_{0|m}b^m\beta^2b^6 \\
& +2784s_{m|0}b^m\beta^2b^2 + 2976s_{m|0}b^m\beta^2b^4 + 832s_{m|0}b^m\beta^2b^6 + 6528s_ms_m^m\beta^3b^2 + 5824s_m^i s_i^m\beta^3b^2 \\
& +6528s_m^i s_i^m\beta^3b^4 + 1112s_{0|m}^m\beta^2 + 80(\text{Ric} - \overline{\text{Ric}})\beta + 832cs_0n\beta^2b^2 + 640cs_0n\beta^2b^4 + 512cs_0nb\beta^2 \\
& +1664cs_0nb^3\beta^2 + 1280cs_0nb^5\beta^2 + 1408(\text{Ric} - \overline{\text{Ric}})\beta b^6 + 512(\text{Ric} - \overline{\text{Ric}})\beta b^8 + 544(\text{Ric} - \overline{\text{Ric}})\beta b^2 \\
& +1344(\text{Ric} - \overline{\text{Ric}})\beta b^4 - 2200s_0^2\beta + 224c^2\beta^3 + 1760s_ms_m^m\beta^2 + 2256cs_0\beta^2 + 1504cs_0\beta^2 + 296s_0^2n\beta \\
& -4928s_0^2\beta b^2 - 7680s_0^2\beta b^4 + 2048s_0^2\beta b^7 + 2816s_0^2\beta b^3 - 576s_0^2b\beta - 5120s_0^2\beta b^6 + 6656s_0^2\beta b^5 + 704c^2\beta^3b^2 \\
& +512c^2\beta^3b^4 - 896c^2\beta^3b - 2816c^2\beta^3b^3 - 2048c^2\beta^3b^5 - 800cs_0\beta^2 + 768s_{0|0}\beta b^2 + 816s_{0|0}\beta b^4 \\
& +256s_{0|0}\beta b^6 - 76s_{0|0}n\beta - 1856cb^2s_0\beta^2 - 960s_ms_m^m n\beta^2 + 4896s_ms_m^m\beta^2b^2 + 4224s_ms_m^m\beta^2b^4 \\
& +1216s_ms_m^m b^6\beta^2 + 8352cs_0b^2\beta^2 + 8928cs_0\beta^2b^4 + 2496cs_0\beta^2b^6 + 5568cs_0b^2\beta^2 + 5952cs_0\beta^2b^4 \\
& +1664cs_0\beta^2b^6 + 57\beta\theta + 18\beta\sigma + 2912s_ms_m^m\beta^3 + 136c_0\beta^2 - 112s_ms_m^m\beta - 1504s_0cn\beta^2 - 1504s_{0|m}b^m\beta^2 \\
& +752s_{m|0}b^m\beta^2 + 6016s_{0|m}^m b^2\beta^2 + 11136s_{0|m}^m b^4\beta^2 + 7936s_{0|m}^m b^6\beta^2 + 1664s_{0|m}^m\beta^2b^8 \\
& +1544s_m^i s_i^m\beta^3 + 1024s_0^2nb^8\beta - 384n\beta b^2\theta - 120n\beta b^2\sigma - 936n\beta b^4\theta - 288n\beta b^4\sigma - 960n\beta b^6\theta \\
& -288n\beta b^6\sigma - 336n\beta b^8\theta - 96n\beta b^8\sigma - 57n\beta\theta - 18n\beta\sigma + 384\beta b^2\theta + 120\beta b^2\sigma + 936\beta b^4\theta \\
& +288\beta b^4\sigma + 960\beta b^6\theta + 288\beta b^6\sigma + 336\beta b^8\theta + 96\beta b^8\sigma - 1024s_0^2b^8\beta + 2\beta(-2064cs_0nb^2\beta
\end{aligned}$$

$$\begin{aligned}
 & -2136cs_0nb^4 + 1104cs_0nb\beta + 2976cs_0nb^3\beta + 1824cs_0nb^5 + 1488c^2nb^2\beta^2 + 912c^2n\beta^2b^4 \\
 & + 672cs_0b^4\beta + 2040cs_0b^2\beta - 156cs_0n\beta + 2976cs_0b^5\beta + 1536cs_0b^3\beta - 1200cs_0b\beta - 912c^2b^4\beta^2 \\
 & - 2712c^2b^2\beta^2 + 552c^2n\beta^2 + 2976c^2b^5\beta^2 + 1536c^2b^3\beta^2 - 1200c^2b\beta^2 - 828c_0nb^2\beta - 1116c_0nb^4\beta \\
 & - 456c_0nb^6\beta - 3616c^2b^4\beta^2 - 1216c^2b^6\beta^2 + 8320c^2b^3\beta^2 + 14464c^2b^5\beta^2 + 4864c^2b^7\beta^2 - 6240c^2nb^2\beta^2 \\
 & - 5424c^2nb^4\beta^2 - 1216c^2nb^6\beta^2 - 6240c_m b^m b^2\beta^2 - 5424c_m b^m b^4\beta^2 - 1216c_m b^m b^6\beta^2 + 1104c^2nb\beta^2 \\
 & + 2976c^2nb^3\beta^2 + 1824c^2n\beta^2b^5 + 198c_0\beta + 2024c^2\beta^2 - 36c_0\beta b^4 - 144c_0b^6\beta - 2100cs_0\beta - 1560c^2\beta^2 \\
 & - 192c_0n\beta + 360c_0\beta b^2 - 2080c^2b^2\beta^2 + 6240c^2b^2\beta^2 + 5424c^2b^4\beta^2 + 1216c^2b^6\beta^2 - 2024c^2n\beta^2 \\
 & - 2024c_m b^m \beta^2) + \beta^3(6672c^2b^4 + 19272c^2b^2 - 2256c^2n - 9240c^2nb^2 - 6504c^2nb^4 + 3504c^2)
 \end{aligned}$$

$$\begin{aligned}
 A'_{10} := & 8(1 + 2b^2)^2(8s_m^i s_i^m \beta b^4 + 4s_{0|m}^m b^4 - 2s_m s_0^m b^2 - 4s_{0|m} b^m b^2 + 6cs_0b^2 + 16s_m s^m \beta b^2 + 4s_{0|m}^m b^2 \\
 & + 4cs_0b^2 + 20s_m^i s_i^m \beta b^2 - 4s_0cnb^2 - 2s_m s_0^m nb^2 + 2s_{m|0} b^m b^2 + 16cb^2s_0b + 3cs_0 + 2cs_0 + s_{0|m}^m - 4cb^2s_0 \\
 & - 2s_{0|m} b^m + 8s_m^i s_i^m \beta + 26s_m s^m \beta - s_m s_0^m n + s_{m|0} b^m + 2s_m s_0^m) + 2\beta(336c^2b^4 + 588c^2b^2 - 27c^2n \\
 & - 180c^2nb^2 - 216c^2nb^4 + 39c^2) - 64cs_0nb^2 - 112cs_0nb^4 + 64cs_0nb^3 + 64cs_0nb^5 + 16cs_0nb + 32c^2\beta nb^2 \\
 & + 64c^2\beta nb^3 + 64c^2\beta nb^5 + 16c^2\beta nb - 704cb^2cb^2\beta - 512c^2b^2b^4\beta + 896c^2b^3\beta + 2816c^2b^5\beta + 320cs_0b^5 \\
 & + 2048c^2b^7\beta - 672c^2nb^2\beta - 1056c^2nb^4\beta - 512c^2nb^6\beta - 672c_m b^m b^2\beta - 1056c_m b^m b^4\beta - 512c_m b^m b^6\beta \\
 & - 68cs_0 - 32c^2\beta - 24c_0b^4 - 2c_0n - 32c_0b^6 + 136c^\beta + 212s_{0|0}\beta + 64cs_0b^4 + 112cs_0b^2 - 4cs_0n \\
 & + 128cs_0b^3 - 16cs_0b - 32c^2\beta b^4 - 80c^2\beta b^2 + 8c^2\beta n + 320c^2\beta b^5 + 128c^2\beta b^3 - 16c^2\beta b - 12c_0nb^2 \\
 & - 24c_0nb^4 - 16c_0nb^6 - 224c^2b^2\beta + 672c^2b^2\beta + 1056c^2b^4\beta + 512c^2b^6\beta b^2 \\
 & + 2c_0 - 136c^2n\beta - 136c_m b^m \beta - 2s_0cn + 32c^2\beta nb^4).
 \end{aligned}$$

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