ABSTRACT. A three-dimensional computer model has been developed to simulate fluid flow through a collapsible tube. The model is based on the immersed boundary method, which is designed to handle a flexible elastic boundary immersed in fluid. This internal boundary is both affected by and has an effect on the motion of the fluid. The setup for collapsible tube simulation involves a fiber-wound elastic tube subjected to an upstream pressure, a downstream pressure, and an external pressure. Partial collapse is observed when the external pressure exceeds the downstream pressure but is less than the upstream pressure. The geometry of the transiently collapsing tube is observed. Collapse is generally localized near the downstream end of the tube, however, under certain conditions, it is also possible for collapse to occur at multiple discrete locations separated by regions of open tubing.