

# FIM

# Nachdiplomvorlesung

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## Variational approach to SPDEs and corresponding Fokker-Planck-Kolmogorov Equations

25 February to 2 June 2016

Thursdays, 14.15 - 16.00 h

HG G 19.2, ETH Zürich, Rämistrasse 101

### Abstract

The lectures will follow mainly [1]. As prerequisites a course in probability theory and some basic knowledge about Hilbert spaces would be helpful, though e.g. even the notion of a martingale will be recalled in the lectures. The first part will be a self-contained introduction to stochastic integration on Hilbert spaces, followed by a part on stochastic differential equations (SDEs) on finite dimensional state spaces. Then as the core of the lectures, the variational approach to SDEs on Hilbert spaces will be presented, first under global monotonicity conditions on the coefficients and subsequently under merely local monotonicity as well as generalized coercivity conditions. Applications to standard stochastic partial differential equations, including the stochastic versions of the parabolic porous media, p-Laplace, Cahn-Hilliard, Burgers and 2D as well as 3D Navier-Stokes equations will be presented. Finally, the connection to the Fokker-Planck-Kolmogorov equations will be discussed and, time permitting, some recent results on the latter explained. This last part will be based on [2].

[1] Wei Liu und Michael Röckner, Stochastic Partial Differential Equations: An Introduction, Universitext, Springer, 2015, pp. 266

[2] Vladimir I. Bogachev, Nicolai V. Krylov, Michael Röckner und Stanislav V. Shaposhnikov, Fokker-Planck-Kolmogorov equations, Russian version: Izhevsk Institute of Computer Science, 2013, English version: AMS-Monographs to appear, pp. 488.

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