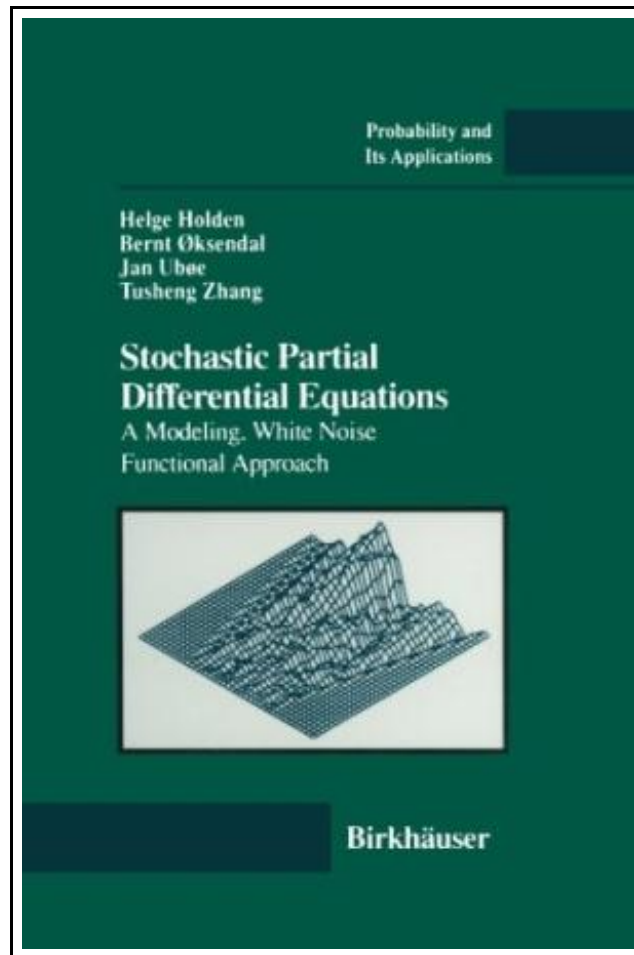# Stochastic Partial Differential Equations

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(Dr. Raven Ledner)

STOCHASTIC PARTIAL DIFFERENTIAL EQUATIONS

Book Condition: New. Publisher/Verlag: Springer, Basel | A Modeling, White Noise Functional Approach | This book is based on research that, to a large extent, started around 1990, when a research project on fluid flow in stochastic reservoirs was initiated by a group including some of us with the support of VISTA, a research coopera tion between the Norwegian Academy of Science and Letters and Den norske stats oljeselskap A.S. (Statoil). The purpose of the project was to use stochastic partial differential equations (SPDEs) to describe the flow of fluid in a medium where some of the parameters, e.g., the permeability, were stochastic or "noisy". We soon realized that the theory of SPDEs at the time was insufficient to handle such equations. Therefore it became our aim to develop a new mathematically rigorous theory that satisfied the following conditions. 1) The theory should be physically meaningful and realistic, and the corre sponding solutions should make sense physically and should be useful in applications. 2) The theory should be general enough to handle many of the interesting SPDEs that occur in reservoir theory and related areas. 3) The theory should be strong and efficient enough to allow us to solve th,~se SPDEs explicitly, or at least provide algorithms or approximations for the solutions. | 1. Introduction.- 1.1. Modeling by stochastic differential equations.- 2. Framework.- 2.1. White noise.- The 1-dimensional, d-parameter smoothed white noise.- The (smoothed) white noise vector.- 2.2. The Wiener-Itô chaos expansion.- Chaos expansion in terms of Hermite polynomials.- Chaos expansion in terms of multiple Itô integrals.- 2.3. Stochastic test functions and stochastic distributions.- The Kondratiev spaces (S)pm;N, (S)-pm;N.- The Hida test function space(S) and the Hida distribution space(S) .- Singular white noise.- 2.4. The Wick product.- Son e examples and counterexamples.- 2.5. Wick multiplication and Itô/Skorohod integration.- 2.6. The...

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