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Stochastic Partial Differential Equations and Related Fields

In Honor of Michael Röckner
SPDERF, Bielefeld, Germany,
October 10–14, 2016

 Springer

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Preface

On October 10–14, 2016, the Faculty of Mathematics at Bielefeld University hosted the international conference “Stochastic Partial Differential Equations and Related Fields.” The goal of the conference was to bring together leading scientists and young researchers in order to present the current state of the art and directions for possible future developments in this exciting and rapidly developing field along with its many interactions.

The recent progress of the mathematical theory of stochastic partial differential equations is mainly driven by a growing interest in modeling and numerical approximation of stochastic processes on multiple space and time scales and by current groundbreaking progress in the mathematical rigorous analysis of stochastic dynamical systems at criticality provided by the theory of regularity structures and paracontrolled distributions. Their further investigation is very likely to influence the future development of stochastic analysis in the upcoming years, also with strong interactions with neighboring disciplines, in particular nonlinear partial differential equations.

More than 140 participants from all over the world, including many young researchers, postdocs, and Ph.D. students, participated in the conference. It consisted of 32 plenary talks by leading experts and 50 session talks given in three parallel sessions during the afternoons, covering major current developments in the field. During the days of the conference, the talks have focused in particular on the following areas:

- Monday, October 10: Theory of Dirichlet forms, potential theory, and geometry on metric spaces.
- Tuesday, October 11: Analysis of Kolmogorov operators, mild and variational solutions of stochastic partial differential equations.
- Wednesday, October 12: Numerical analysis of stochastic partial differential equations and analysis of stochastic partial differential equations with random coefficients, random transport equations.
- Thursday, October 13: Rough paths, singular stochastic partial differential equations, regularity structures, and the theory of paracontrolled distributions.

- Friday, October 14: Functional inequalities, Gibbs measures, and applications of stochastic partial differential equations, in particular to mathematical physics.

A special session of the conference was dedicated to celebrate the 60th birthday of Michael Röckner. His more than 30 years of research in the field of infinite dimensional stochastic analysis had a major impact on the development of the mathematical theory of stochastic partial differential equations up to its present state. It has inspired many young researchers to take up their research in this exciting field of mathematics.

Michael Röckner studied Mathematics and Physics at Bielefeld University (1976–1982). He received a Doktor degree in Mathematics from Bielefeld University in 1984 under the supervision of Sergio Albeverio. After spending the years 1984–1985 as a Visiting Fellow at Cornell University, he started a position as Lecturer at the University of Edinburgh in 1986, where he was promoted to Reader in 1989. In 1990, Michael Röckner returned to Germany and became a C3 Professor at the University of Bonn. Four years later, he accepted an offer from Bielefeld University for a Full Professorship (C4). In 2005, he became a Full Professor at Purdue University, W. Lafayette, Indiana, USA, but he returned to Bielefeld as Full Professor (W3) only one year later, where he is staying since then.

Michael Röckner has received several awards and recognitions, including the Heinz Maier-Leibnitz Prize (1989) and the Max Planck Research Award (1992), as well as offers for full professorships from the Universities of Bochum (1994), Leipzig (1998), Edinburgh (2005), and Bonn (2006). In 2014, he was awarded a “Specially-Invited-Professorship” by Jiangsu Normal University in Xuzhou. In 2017, he has received an honorary “Doctor of Science” degree from Swansea University and became a “Distinguished Visiting Professor” through the national “Innovative Talent Recruitment Program” at the Academy of Mathematics and System Science at the Chinese Academy of Sciences in Beijing. He received numerous grants from the German Research Foundation (DFG), the German Academic Exchange Service (DAAD), the Science and Engineering Research Council (SERC), the National Science Foundation (NSF), and the European Union. He served as Dean of the Department of Mathematics at Bielefeld University in the years 1997–1999, and from the year 2010 on until present.

During all of his academic career, Michael Röckner served the scientific community on several panels, including the DFG Commission for Collaborative Research Centers (2006–2011), the selection committee for Humboldt Research Awards (since 2012), and the panel “PE 1 Mathematics” of the European Research Council (2008–2013, Chairman 2015/2016, 2017/2018). He is currently also President of the German Mathematical Society (DMV).

Up to the present date, Michael Röckner supervised 21 Ph.D. students, 32 postdocs, and 7 Humboldt scholars. Many of them later became professors in Germany and abroad. Currently, he has published more than 260 research papers in scientific journals, more than 50 refereed contributions to proceedings, and he is the author of 8 monographs and the editor of 9 proceedings and special volumes.

The editors of this Festschrift asked the participants of the conference in Bielefeld to submit short research contributions related to the main topic of the conference. The aim was to present current research questions that can help especially young researchers but also mathematicians from different research areas to get an extensive overview on the current state of the art in the subject. The volume contains 34 short contributions to the following subject areas:

- Stochastic partial differential equations and regularity structures.
- Stochastic analysis including geometric aspects.
- Dirichlet forms, Markov processes, and potential theory.
- Applications including mathematical physics.

To honor Michael Röckner's contribution to the field, the editors also invited five colleagues to provide longer research surveys dedicated to one of Michael Röckner's research topics: Dirichlet forms and potential theory, analysis of Kolmogorov operators (in infinite dimensions), Fokker–Planck equations in Hilbert spaces, theory of variational solutions to stochastic partial differential equations and singular stochastic partial differential equations and their applications in mathematical physics.

With these 34 short and 5 longer contributions, we hope to provide a broad picture of the current state and open problems in this exciting research area.

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 Bielefeld, Germany
 Berlin, Germany
 Seoul, South Korea
 October 2017

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