Special Guest Lectures

Error Analysis of the Finite Element Method for the Stochastic Heat Equation with Additive Noise

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Abstract:
We consider the heat equation driven by additive noise. We discretize the equation in space by the standard continuous finite element method and derive two kinds of error estimates. The first kind of estimate measures the error in the mean square norm and shows the so called strong convergence. Here, error estimates for the deterministic problem give error estimates for the stochastic equation in a more or less straightforward fashion. In the second type of error analysis the error is measured in the weak sense of probability measures and implies the so called weak convergence. The analysis in this case is surprisingly complicated and uses more advanced results both from infinite dimensional stochastic analysis as well as from functional analysis. We prove that, similarly to stochastic ODEs, the rate of weak convergence is twice that of strong convergence. In both cases, the analysis is done in the operator semigroup framework for stochastic PDEs proposed by Da Prato and Zabczyk.

Speaker's Bio:
Dr. Mihaly Kovacs' current position is at the University of Otago, New Zealand, Department of Mathematics and Statistics. He received his Ph.D. in Mathematics (2004) from Louisiana State University, his M.S. in Mathematics (2002) from Louisiana State University, a second M.S. in Meteorology (2000) from Eotvos Lorand University, Budapest, Hungary, and a third M.S. in German Technical Translation (2000) from Eotvos Lorand University, Budapest, Hungary. His areas of expertise are: stochastic PDEs, fractional PDEs and PDEs with numerical methods, approximation theory of semi-groups, qualitative properties of time-discretization schemes for semigroups, functional calculi for closed operators.

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