TEMPLE UNIVERSITY
Department of Mathematics

Applied Mathematics and Scientific Computing Seminar

Wednesday, 22 February 2017, 4:00 p.m.
Room 617 Wachman Hall

(refreshments and social at 3:45 p.m)

Numerical Solution of Linear Stochastic Partial Differential Equations

by Hernmann Mena
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Abstract. We study the numerical solution of linear stochastic partial differential equations (SPDEs). In particular we discuss splitting methods for SPDEs with additive/multiplicative noise and Dirichlet boundary conditions. The equations are considered in the framework of white noise analysis, where every square integrable stochastic processes corresponds to a unique sequence of deterministic coefficients, obtained by projecting the process to certain orthogonal basis of stochastic polynomials. Thus, applying this method we transform the initial stochastic equation into a system of infinitely many deterministic partial differential equations (PDEs) in terms of the coefficients of the solution. We compute finitely many coefficients and discuss the convergence of the solution. In addition, due to the fact that the mean and the variance of the solution of a linear SPDE can be characterised through a deterministic PDE and a matrix differential equation, respectively, we approximate these statistics directly by solving these equations. As an illustration of our approach we present a numerical simulation of El Niño phenomena.

This is joint work with Lena-Maria Pfurtscheller (University of Innsbruck)