Computational Mathematics Seminar Series

Wiener-Chaos finite element methods for the approximation of infinite-dimensional stochastic elliptic equations

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Johnston Hall 338
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Abstract:
We consider a stochastic Darcy's pressure equation whose coefficient is generated by a white noise process on a Hilbert space employing the ordinary (rather than the Wick) product. A weak form of this equation involves different spaces for the solution and test functions and we establish a continuous inf-sup condition and well-posedness of the problem. We generalize the numerical approximations proposed in Benth and Theting [Stochastic Anal. Appl., 20 (2002), pp.~1191--1223] for Wick stochastic partial differential equations to the {\it ordinary} product stochastic pressure equation. We establish discrete inf-sup conditions and provide a priori error estimates for Hida-Kuo-Kondratiev-Streit type norms. The proposed numerical approximation is based on Wiener-Chaos finite element methods and yields a positive definite symmetric linear system. We also improve and generalize the approximation results of Benth and Gjerde [Stochastics Stochastics Rep., 63 (1998), pp.~313--326] and Cao [Stochastics, 78 (2006), pp.~179--187] when a (generalized) process is truncated by a finite Wiener-Chaos expansion. Finally, we present 1D numerical experiments to validate the results.

Speaker's Bio:
Juan Galvis received his bachelor's degree from the Universidad de Cartagena in Cartagena de Indias, Columbia in 2001. He received his M.S. in Applied Mathematics at the Instituto Nacional de Matematica Pura Aplicada-IMPA in Brazil in 2004 and his PhD in Mathematics from the same university. He is currently serving as a visiting assistant professor (post-doc) at Texas A&M University.

Refreshments will be served.
This lecture has a reception.

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