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DK Seminar

Jun 14, 2017, 14:15 - 15:00
Vienna University of Technology,
Freihaus, green area, 4th floor, 101C

Michael Feischl

UNSW Sydney

Fast random field generation and adaptive algorithms

We use the H-matrix technology to compute the approximate square root of a covariance matrix in linear complexity. This allows us to generate normal and log-normal random fields on general finite point sets with optimal complexity. We derive rigorous error estimates, which show that particularly for short correlation length, this new method outperforms the standard method of truncating the Karhunen-Loève expansion. The method requires only mild assumptions on the covariance function and on the point set and is therefore particularly well suited for adaptive mesh refinement algorithms for PDEs with random coefficients. It might also be an alternative to circulant embedding, which is well-defined only for regular grids and stationary covariance functions.