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Mathematics Institute of Computational Science and Engineering - MATHICSE

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## ***SEMINAR OF NUMERICAL ANALYSIS***

➤ **WEDNESDAY 9 OCTOBER 2013 - 14 h 15, ROOM GR A3 31**

*Dr. Oleg Reichmann, (ETH Zürich, Switzerland)* will present a seminar entitled:

### ***"Highdimensional option pricing and time-inhomogeneity"***

Abstract:

Lévy processes have, since their initial use in the early 1990ies by D. Madan and his collaborators, become a standard tool in financial modeling. Time-inhomogeneity severely hampers their efficient performance in pricing derivatives across multiple strikes and maturities in markets which are intrinsically time inhomogeneous.

We present a class of numerical methods for time-inhomogeneous parabolic partial integrodifferential equations (PIDEs) which exhibit strong degeneracies in time and arise in such models.

We establish existence and uniqueness of space-time variational solutions of these strongly degenerate highdimensional PIDEs.

A weak space-time formulation is considered. The use of appropriate wavelet bases in the space-time domain leads to Riesz bases for the ansatz and test spaces.

Besides, a class of variational timestepping schemes is discussed and their exponential convergence is proved. For the spatial domain a low rank approximation using the tensor-train format is employed.

Numerical experiments in multiple space dimensions confirm the theoretical results.

Lausanne, 10 September 2013/DK/cr

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The seminars taking place at the Section of Mathematics are announced on internet address : [www  
http://mathicse.epfl.ch/seminars](http://mathicse.epfl.ch/seminars)