Seminar "Numerical Finance" – List of topics

A "×" means that the topic has already been chosen whereas "✓" means that the corresponding topic is still available.

FFT based/related methods

× F. Fang and C. W. Oosterlee. *A novel pricing method for European options based on Fourier-cosine series expansions.* SIAM Journal on Scientific Computing 31(2):826–848, 2008.

Keywords: European and American options, Lévy process, Fourier-type methods.

× R. Lord, F. Fang, F. Bervoets, and C. W. Oosterlee. *A fast and accurate FFT-based method for pricing early -exercise options under Lévy processes.* SIAM Journal on Scientific Computing 30(4):1678-1705, 2008.

Keywords: Bermudan and American options, FFT, Lévy process.

Monte Carlo methods

× R. Kiesel, J. Gernhard, and S.-O. Stoll. *Valuation of commodity-based swing options.* Journal of Energy Markets 3(3):91-112, 2010.

Keywords: Energy markets, swing options, least-square Monte-Carlo.

✓ I. H. Sloan and X. Wang. *Why are high-dimensional finance problems often of low effective dimension.* SIAM Journal on Scientific Computing 27(1):159-183, 2005.

Keywords: effective dimension, quasi-Monte Carlo, bond valuation.

× P. Tankov. *Simulation and option pricing in Lévy copula models.* Technical report, http://www.proba.jussieu.fr/pageperso/tankov/levycopulas_ima.pdf, 2005.

Keywords: Lévy (copula) processes, Monte Carlo method.

Sparse grid methods

✓ H.-J. Bungartz, A. Heinecke, D. Pflüger, and S. Schraufstetter. *Option pricing with a direct adaptive sparse grid approach.* Journal of Computational and Applied Mathematics 236:3741-3750, 2012.

Keywords: Sparse grids, adaptivity, basket option.

✓ C. Reisinger and G. Wittum. *Efficient hierarchical approximation of high-dimensional option pricing problems.* SIAM Journal on Scientific Computing 29(1):440-458, 2007.

Keywords: sparse grid, basket option, dimension reduction.

Reduced basis methods

× R. Cont, N. Lantos, and O. Pironneau. *A reduced basis for option pricing.* SIAM Journal on Financial Mathematics 2:287-316, 2011.

Keywords: Reduced basis, jump-diffusion model.

✓ B. Haasdonk, J. Salomon, and B. Wohlmuth. *A reduced basis method for the simulation of American options.* Preprint, 2012.

Keywords: Reduced basis, American options.

✓ O. Pironneau. *Proper orthogonal decomposition for pricing options.* Journal of Computational Finance 16(1):33-46, 2012.

Keywords: POD, reduced basis, spectral method.

FE, FD and other PDE/PIDE based methods

× A. Almendral and C. W. Oosterlee. *Accurate evaluation of European and American options under the CGMY process.* SIAM Journal on Scientific Computing 29(1):93-177, 2007.

Keywords: European and American options, finite difference method, Lévy process, non-local operator.

✓ C. C. Christara and D. M. Dang. *Adaptive and high-order methods for valuing American options.* Journal of Computational Finance 14(4):73-113, 2012.

Keywords: Linear complementarity problem, space-time adaptive via FEM (space) and FDM (time).

✓ M. Dahlgren and R. Korn. *The swing option on the stock market.* International Journal of Theoretical and Applied Finance 8(1):123-139, 2005.

Keywords: Optimal stopping problem, HJB variational inequality.

✓ Y. D'Halluin, P. A. Forsyth, and G. Labahn. *A semi-Lagrangian approach for American Asian options under jump diffusion.* SIAM Journal on Scientific Computing 27(1):315-345, 2005.

Keywords: Asian option, American option, semi-Lagrangian, jump diffusion.

✓ N. Hilber, C. Schwab, and C. Winter. Variational sensitivity analysis of parametric Markovian models. In *Advances in Mathematics of Finance*, volume 83, pages 85-106, 2008. Also available as preprint:

http://www.sam.math.ethz.ch/sam_reports/reports_final/reports2008/2008-29.pdf

Keywords: Markov process, sensitivities, Greeks.

× M. H. Ngyuen and M. Ehrhardt. *Modelling and numerical valuation of power derivatives in energy markets.* Advances in Applied Mathematics and Mechanics 4(3):259-293, 2012.

Keywords: Swing options, energy market, partial integrodifferential equation, Finite Differences.

× M. Wilhelm and C. Winter. *Finite element valuation of swing options.* Journal of Computational Finance 11(3):107-132, 2008.

Keywords: Swing options, finite element method, multiple stopping problem.