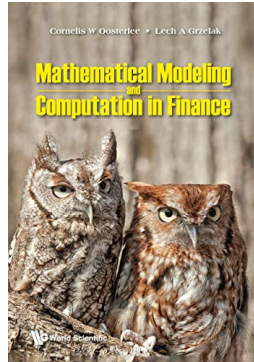


Mathematical Modeling and Computation in Finance

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In this lecture series, we will discuss several aspects of modeling and numerics of financial contracts. Parts of the lecture are based on our recent textbook “Mathematical Modeling and Computation in Finance”. We will focus on stochastic volatility type models to explain the different aspects.

Next to calibration, on the basis of the Fourier-cosine expansion method (“the COS method”), we will give details of Monte Carlo pricing methods of non-European option contracts. Also the pricing of Credit Valuation Adjustment, in the context of modern risk management, is discussed. The use of machine-learning techniques, particularly artificial neural networks, for pricing and calibration is also explained in quite some detail.

Outline:

Lecture 1-2, Day 1: Asset price models, option pricing and the characteristic function

Lecture 3-4, Day 2: The COS method for pricing European, American and some exotic options

Lecture 5-6, Day 3: Monte Carlo methods, with a focus on the stochastic volatility model

Lecture 7-8, Day 4: Monte Carlo, machine-learning, early-exercises options, CVA, XVA

Lecture 9-10, Day 5: Neural networks for option pricing and asset model calibration

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Short Bio

Prof. dr. ir. **Cornelis W. Oosterlee** is part-time full professor at Delft University of Technology in Applied Numerical Mathematics. He is also senior scientist at CWI – Centrum Wiskunde & Informatica — and member of the management team. He was the editor-in-chief of the *Journal of Computational Finance*, between 2013-2018, and the Chair of the Dutch-Flemish Society for Computational Sciences (SCS), which has 400 members, from 2014-2019. He has also been coordinator of various EU Marie Curie projects. His research focus is on developing and analysing novel, robust and efficient algorithms, with a particular interest in computational finance. He has written two textbooks and 150 research articles.