

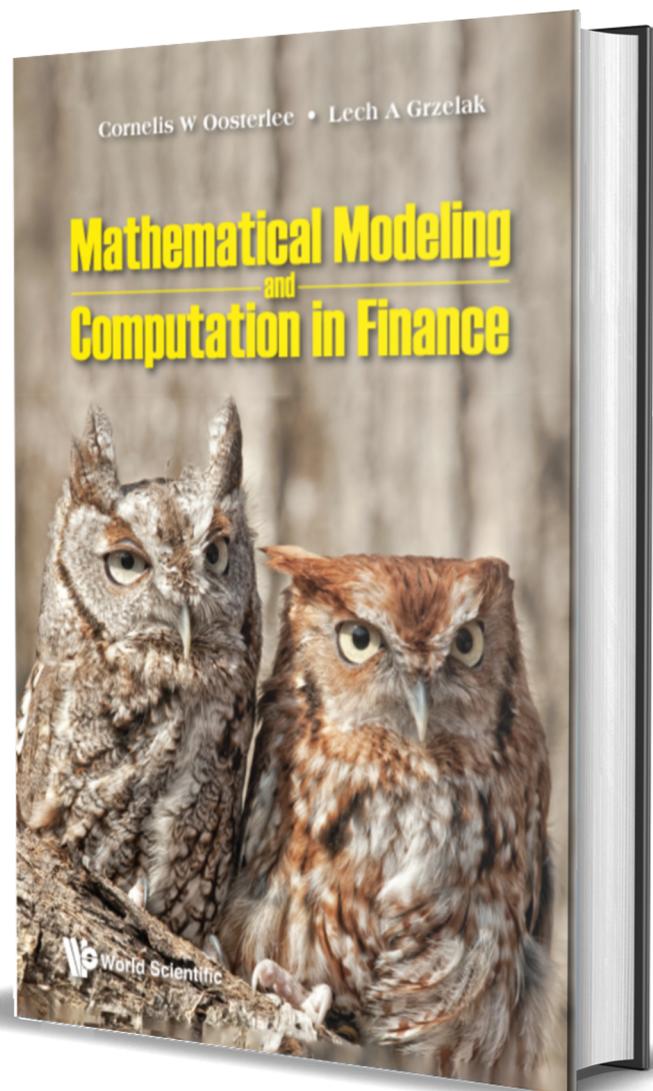
# Mathematical Modeling and Computation in Finance

With Exercises and Python and MATLAB Computer Codes

Cornelis W Oosterlee  
Lech A Grzelak

This book discusses the interplay of stochastics (applied probability theory) and numerical analysis in the field of quantitative finance. The stochastic models, numerical valuation techniques, computational aspects, financial products, and risk management applications presented will enable readers to progress in the challenging field of computational finance.

When the behavior of financial market participants changes, the corresponding stochastic mathematical models describing the prices may also change. Financial regulation may play a role in such changes too. The book thus presents several models for stock prices, interest rates as well as foreign-exchange rates, with increasing complexity across the chapters. As is said in the industry, "do not fall in love with your favorite model." The book covers equity models before moving to short-rate and other interest rate models. We cast these models for interest rate into the Heath-Jarrow-Morton framework, show relations between the different models, and explain a few interest rate products and their pricing.



540pp | Nov 2019

Hardcover 978-1-78634-794-7 | US\$98 / £85

Softcover 978-1-78634-805-0| US\$58 / £50

Order your copy at <https://doi.org/10.1142/q0236>



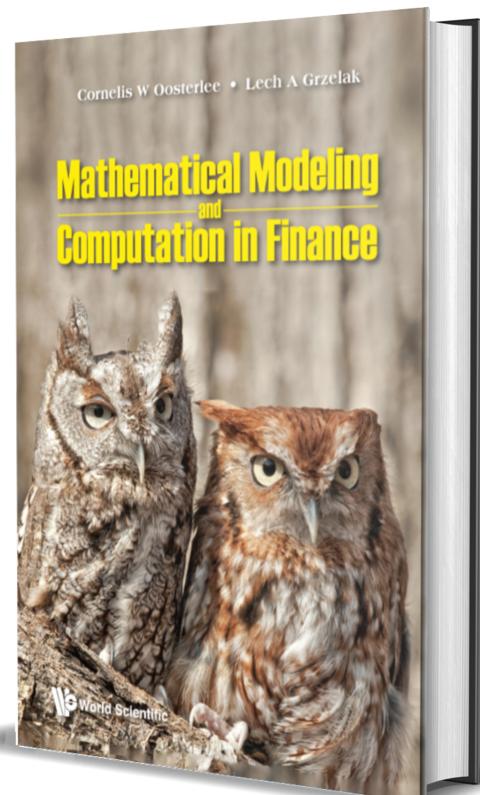
## ABOUT THE AUTHORS

Cornelis W ("Kees") Oosterlee is a Professor of applied numerical mathematics at Delft University of Technology. He is also senior scientist at CWI — Centrum Wiskunde & Informatica, in Amsterdam — and member of CWI's management team. Kees got his PhD from Delft in 1993, after which he worked in the German research center FhG SCAI for eight years. His research focus is on developing novel, robust and efficient algorithms, with a particular interest in computational finance. He has written a textbook and many research articles. Kees was the editor-in-chief of the *Journal of Computational Finance*, from 2013 to 2018. From 2014 to 2019, he was Chair of the Dutch-Flemish Society for Computational Sciences (SCS). He has been coordinator of various EU research projects. He teaches the M.Sc. course "Computational Finance" and the B.Sc. course "Option Valuation Methods", and taught summer- and winter-school courses in Italy, Spain, South Africa, and Japan.

Lech A Grzelak is a front office Sr. Quantitative Analyst at the Financial Engineering team at Rabobank in the Netherlands. At the same time, he holds a lecturer position at the Delft University of Technology where he teaches a course on Financial Engineering. Lech received his Ph.D. in Numerical Analysis at Delft University of Technology in 2011. His main areas of research are computational finance, numerical analysis, scientific computing and high-performance computing methods. Recent work has focused on efficient numerical methods for stochastic and local volatility models, cross-asset hybrid models and xVA. Lech is the editor of the *Journal of Computational Finance* and the *Journal of Applied Mathematics and Computation*. Lech has published several research articles on quantitative finance in multiple prime journals.

## CONTENTS

- Basics about Stochastic Processes
- Introduction to Financial Asset Dynamics
- The Black-Scholes Option Pricing Equation
- Local Volatility Models
- Jump Processes
- The COS Method for European Option Valuation
- Multidimensionality, Change of Measure, Affine Processes
- Stochastic Volatility Models
- Monte Carlo Simulation
- Forward Start Options; Stochastic Local Volatility Model
- Short-Rate Models
- Interest Rate Derivatives and Valuation Adjustments
- Hybrid Asset Models, Credit Valuation Adjustment
- Advanced Interest Rate Models and Generalizations
- Cross-Currency Models



Request for Inspection Copy at

<https://tinyurl.com/q0236fin>

For orders and enquiries:

USA | Tel: 1-201-487-9655 | E-mail: [sales@wspc.com](mailto:sales@wspc.com)

UK | Tel: 44-20-7836-0888 | E-mail: [direct.orders@marston.co.uk](mailto:direct.orders@marston.co.uk)

ASIA | Tel: 65-6466-5775 | E-mail: [sales@wspc.com](mailto:sales@wspc.com)