

Preface

This is the second volume of the series “The Reacting Atmosphere”, which stems from the transdisciplinary Research Network coordinated at the University of Wuppertal, Germany. It combines the competences in atmospheric physics and chemistry, applied mathematics and socio-economic science.

This second volume is edited by the applied mathematics group organized at the Institute of Mathematical Modelling, Analysis and Computational Mathematics (IMACM). There is a strong interest at the IMACM in tackling mathematical problems arising in the environmental sciences like the modelling of oil spills, especially the analysis of mathematical models of these spills in seas, design of numerical algorithms for transport of oil spills, and creating methods for determining the location, time and total power of oil emissions (inverse problems), i.e. for the simulation and detection of oil spill emitters.

Let me emphasize that there are close links between oil pollution problems and air pollution models. First, on a modelling level the oil pollution on the sea surface is naturally coupled to pollution in the lower layers of the atmosphere. Secondly, from a purely mathematical point of view, the models, i.e. the partial differential equations exhibit a very similar structure. Finally, from a socio-economic viewpoint, a major part of the pollution in both areas is caused by humans and is often the result of economic decisions or behaviour.

The collected chapters in this book cover a wide range of subjects, from pure mathematics to real-world applications in the oil spill engineering business. The reader will quickly recognize the increasingly interdisciplinary nature of these works. It is indispensable that different disciplines of mathematics, like analysis and numerics, together with physics, biology, fluid dynamics, environmental engineering and marine science join forces to solve today’s oil pollution problems.

Mathematical Modelling and Numerical Simulation of Oil
Pollution Problems

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2015, X, 166 p. 58 illus., 44 illus. in color., Softcover

ISBN: 978-3-319-16458-8