



Singularities: Formation, Structure, and Propagation (Cambridge Texts in Applied Mathematics)

By J. Eggers, M. A. Fontelos



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Many key phenomena in physics and engineering are described as singularities in the solutions to the differential equations describing them. Examples covered thoroughly in this book include the formation of drops and bubbles, the propagation of a crack and the formation of a shock in a gas. Aimed at a broad audience, this book provides the mathematical tools for understanding singularities and explains the many common features in their mathematical structure. Part I introduces the main concepts and techniques, using the most elementary mathematics possible so that it can be followed by readers with only a general background in differential equations. Parts II and III require more specialised methods of partial differential equations, complex analysis and asymptotic techniques. The book may be used for advanced fluid mechanics courses and as a complement to a general course on applied partial differential equations.

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Editorial Review

Review

"The book will serve as an excellent introduction to the field of singularities in continuum mechanics, and a valuable resource for researchers ... In short, a wonderful achievement!"

H. K. Moffatt, Journal of Fluid Mechanics

About the Author

J. Eggers is Professor of Applied Mathematics at the University of Bristol. His career has been devoted to the understanding of self-similar phenomena, and he has more than fifteen years of experience in teaching non-linear and scaling phenomena to undergraduate and postgraduate students. Eggers has made fundamental contributions to our mathematical understanding of free-surface flows, in particular the break-up and coalescence of drops. His work was instrumental in establishing the study of singularities as a research field in applied mathematics and in fluid mechanics. He is a member of the Academy of Arts and Sciences in Erfurt, Germany, a fellow of the American Physical Society, and has recently been made a Euromech Fellow.

M. A. Fontelos is a researcher in applied mathematics at the Spanish Research Council (CSIC). His scientific work has focused on partial differential equations and their applications to fluid mechanics, with special emphasis on the study of singularities and free-surface flows. His main results concern the formation of singularities (or not) combining the use of rigorous mathematical results with asymptotic and numerical methods.

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