

The Fractional Laplacian

By C. Pozrikidis

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The Fractional Laplacian By C. Pozrikidis

The fractional Laplacian, also called the Riesz fractional derivative, describes an unusual diffusion process associated with random excursions. **The Fractional Laplacian** explores applications of the fractional Laplacian in science, engineering, and other areas where long-range interactions and conceptual or physical particle jumps resulting in an irregular diffusive or conductive flux are encountered.

- Presents the material at a level suitable for a broad audience of scientists and engineers with rudimentary background in ordinary differential equations and integral calculus
- Clarifies the concept of the fractional Laplacian for functions in one, two, three, or an arbitrary number of dimensions defined over the entire space, satisfying periodicity conditions, or restricted to a finite domain
- Covers physical and mathematical concepts as well as detailed mathematical derivations
- Develops a numerical framework for solving differential equations involving the fractional Laplacian and presents specific algorithms accompanied by numerical results in one, two, and three dimensions
- Discusses viscous flow and physical examples from scientific and engineering disciplines

Written by a prolific author well known for his contributions in fluid mechanics, biomechanics, applied mathematics, scientific computing, and computer science, the book emphasizes fundamental ideas and practical numerical computation. It includes original material and novel numerical methods.

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Editorial Review

About the Author

Constantine Pozrikidis is a professor at the University of Massachusetts Amherst. He is well known for his contributions in fluid mechanics, biomechanics, applied mathematics, scientific computing, and computer science. He is the author of numerous research papers and books, including the highly recommended Chapman & Hall/CRC books *Introduction to Finite and Spectral Element Methods Using MATLAB®, Second Edition; XML in Scientific Computing; Computational Hydrodynamics of Capsules and Biological Cells; Modeling and Simulation of Capsules and Biological Cells*; and *A Practical Guide to Boundary Element Methods with the Software Library BEMLIB.*

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