Sarkar

Environmental Turbulence

From Fundamental Physics to Critical Applications

Environmental Turbulence: From Fundamental Physics to Critical Applications explains how to understand environmental and geophysical turbulence, both at a theoretical level and in engineering applications. Sections cover the effects of these new features on the fundamental flow dynamics in relatively simple domains. That is, how the turbulence statistics and structure are modified by the stabilizing or destabilizing effects of buoyancy and rotation is surveyed. Scalar transport is also described in detail. Flow in more complex domains is then described, focusing on vegetated and urban canopies, wind farms, air-sea interfaces, the upper ocean and clouds. Turbulence in environmental media is strongly modulated by buoyancy forces at all scales and by rotation at the largest scales, in contrast to canonical turbulent flows. It is rarely steady, which can give rise to non-equilibrium effects, and the domains such as wind farms or cities are often quite complex, leading to more intricate dynamics than in classic wall-bounded or free shear flows.

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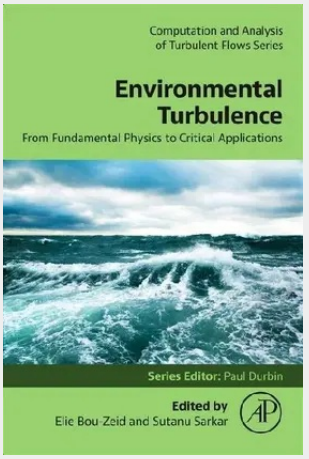

175,50 €
175,50 € (zzgl. MwSt.)

Nicht mehr lieferbar

Artikelnummer: 9780323958738
Medium: Buch
ISBN: 978-0-323-95873-8
Verlag: Elsevier Science
Erscheinungstermin: 05.08.2026
Sprache(n): Englisch
Auflage: Erscheinungsjahr 2026
Produktform: Kartoniert
Gewicht: 720 g
Seiten: 440
Format (B x H): 151 x 228 mm

Kundenservice Verlag Dr. Otto Schmidt KG
Neumannstraße 10, 40235 Düsseldorf | kundenservice@otto-schmidt.de | 0221-93738-997 (Inland)