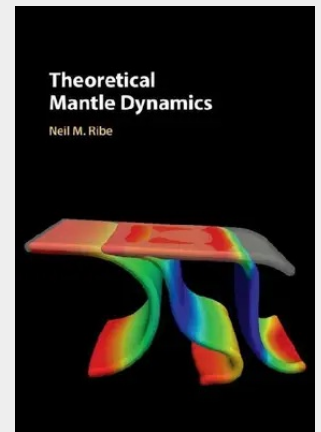


Theoretical Mantle Dynamics

Geodynamics is the study of the deformation and flow of the solid Earth and other planetary interiors. Focusing on the Earth's mantle, this book provides a comprehensive, mathematically advanced treatment of the continuum mechanics of mantle processes and the craft of formulating geodynamical models to approximate them. Topics covered include slow viscous flow, elasticity and viscoelasticity, boundary-layer theory, long-wave theories including lubrication theory and shell theory, two-phase flow, and hydrodynamic stability and thermal convection. A unifying theme is the utility of powerful general methods (dimensional analysis, scaling analysis, and asymptotic analysis) that can be applied in many specific contexts. Featuring abundant exercises with worked solutions for graduate students and researchers, this book will make a useful resource for Earth scientists and applied mathematicians with an interest in mantle dynamics and geodynamics more broadly.

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