Physics of Continuous Matter – Exotic and Everyday Phenomena in the Macroscopic World

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"Continuum physics describes the physical world on a macroscopic scale". With this quote at hand the author gives the reader a 600-page tour de force through the underlying principles of continuum physics and it application in geophysics, astrophysics, engineering, biophysics, and nonlinear sciences such as rheology. Subjects taught in engineering classes but rarely make their way to physics classes and vice versa are joined. The book is divided into five chapters on Basic Concepts on Physics (Introduction), Fluids at Rest, Deformable Solids, Basic Hydrodynamics and a section of Special Topics. Within those chapter common knowledge is presented in a straightforward manner but also various side aspects will surprise the reader. For example, the author discusses the "urban myth" of bathtub vortex', Big Bang and Newton cosmology, and lubrication. The beauty of this approach is that subjects, who belong together or are link to each other, are presented in one generic approach. The condensed presentation of the individual subjects, the introduction of the governing equations as well as numerous figures keep the vast amount of knowledge digestible and accessible. Actually the fact that a lot of equations I normally look up in different textbook, and eventually not finding them, are summarized here qualifies the book as reference. Readers should have a background in continuums mechanics and/or engineering to access the material properly. For basic classes in continuum mechanic the book is suitable as well. The Chapters include sections on continuous matter, space and time, gravity (Introduction), pressure, buoyancy, planet and stars, hydrostatic shapes, surface tension (Fluids at Rest), stress, strain, linear elasticity, solids at rest, computational elastostatics, elastic vibrations (Deformable Solids), fluids in motion, nearly ideal flow, viscosity, plates and pipes, creeping flow, rotating fluids, CFD (Basic Hydrodynamics), global laws of balance, reaction forces and moments, small-amplitude surface waves, jumps and shocks, whirls and vortices, lubrication, boundary layers, subsonic flight, heat, convection and turbulence (Special Topics).

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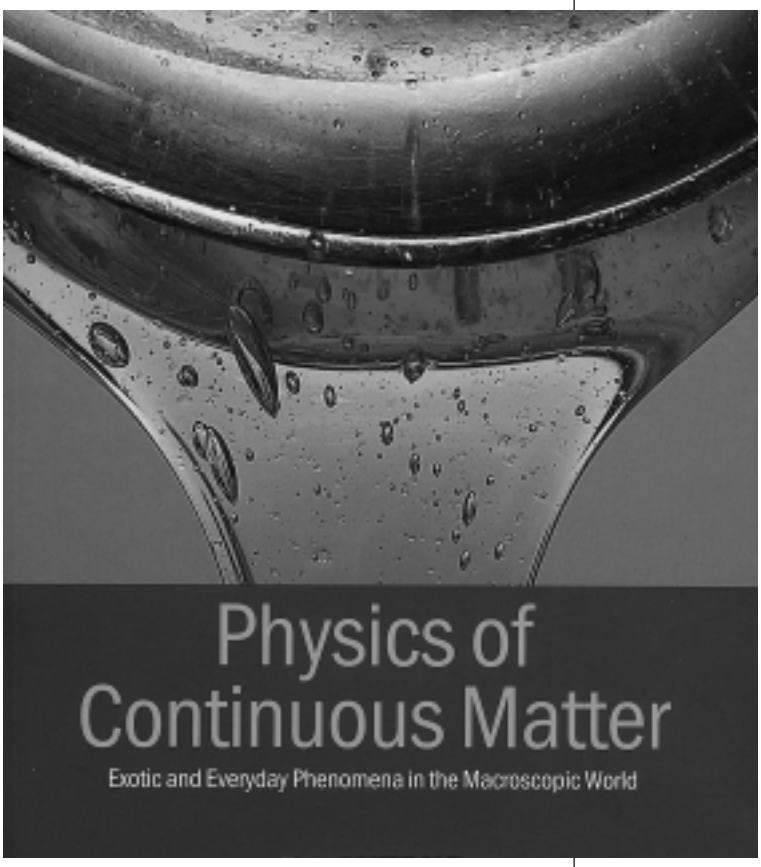

Bibliography:
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