Book Review

Geophysical Continua: Deformation in the Earth's Interior by B.L.N. Kennett and H.-P. Bunge,
Cambridge University Press, 2008; ISBN: 978-0-521-86553-1 (hardback), USD 72.00

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The theory of continuum mechanics allows fundamental insight into geodynamics and the structure of the Earth. With ever more powerful computers, numerical modeling of geophysical continua has become increasingly important during the last decade. Written by a seismologist and a numerical modeler, this book covers both the experimental and the modeling aspect of geophysical continuum mechanics.

The monograph is divided in two parts: (1) continuum mechanics in geophysics and (2) earth deformation. Part 1 successively builds up the mathematical/physical background and introduces today's computational techniques. It covers fundamental principles of deformation, both in Lagrangian and Eulerian descriptions, and treats rheological concepts in great detail. The authors are not afraid to use formulas, whose clarity is great for modelers and geophysicists, but might be difficult to understand for pure geoscientists. Basic knowledge of linear algebra is required, as fundamental concepts are used without introducing explanations. Altogether, this part is highly recommendable to graduate geophysicists, PhD students and practicing earth scientists.

Part 2 treats the phenomenological perspective. Microscopic properties are related to macroscopic

rheology and geological deformation. Classical concepts are combined with present-day research in seismology, lithosphere deformation, mantle convection and core dynamics. References are made to seismological observations, experimental results and conclusions of numerical studies, thus providing insights into geodynamic interpretations. Despite some links to part 1, the second part does not require the complete lecture of the first one. It illustrates applications of continuum mechanics to geodynamic topics in a general way, which makes it comprehensible both to undergraduate as well as graduate students and beyond.

According to the authors, the textbook is designed for graduate level courses in geophysics and geodynamics. But due to the clear structuring, a helpful index and the well-arranged table of notation, it is useful as a reference book, too. A minor drawback is that for several figures the literature sources are unclear, which impedes further reading.

"Geophysical Continua" bridges the fields of geophysical phenomenology and mathematical modeling that are commonly treated separately. It describes deformation of the Earth from geologic to seismic time scales in a systematic treatment. Due to its extensive but condensed style, this book can be highly recommended for geodynamic modelers.

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