



Introduction to numerical geodynamic modeling II: what's new?

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This year, a significantly revised second edition of the textbook “Introduction to numerical geodynamic modeling” will be published by Cambridge University Press, which consists of 21 chapters, Introduction and Outlook. The main reason of writing this second edition is the rapid recent progress in the field of numerical geodynamic modelling, which is one of the most dynamic and rapidly broadening fields of the modern Earth sciences. Since the publication of the first edition in 2010 (almost a decade ago...), several important research directions became very prominent and advanced in computational geodynamics, such as investigation of coupled solid-fluid processes, coupling of geodynamic evolution to surface processes, modelling of seismic cycles at plate boundaries, development of adaptive grid refinement methods and free surface stabilization approaches, elaboration of more accurate continuity-based Lagrangian advection algorithms, development and broad application of new efficient 3D visco-elasto-plastic highly parallelized numerical modelling tools etc. In order to account for some of these exciting novelties, I both significantly revised some of the previously published chapters (especially on numerical modelling of advection processes in Chapter 8 and numerical treatment of visco-elasto-plastic materials in Chapters 12, 13) and added four new chapters focusing on recent numerical advances in

- modelling of inertial processes (Chapter 14),
- modelling of seismic cycles (Chapter 15),
- modelling of coupled fluid-solid processes (Chapter 16) and
- development of adaptive mesh refinement algorithms (Chapter 17).

As in the first edition, a single relatively simple numerical modelling method (combination of staggered finite differences with marker in cell techniques, SFD+MIC) and MATLAB programming are used uniformly throughout the textbook. In this presentation, I will discuss in short main novelties and advances made in the textbook.

<https://www.cambridge.org/us/academic/subjects/earth-and-environmental-science/structural-geology-tectonics-and-geodynamics/introduction-numerical-geodynamic-modelling-2nd-edition?format=HB>