Fully convective models of some processes in the Earth

Prof. Dr. T. Roubíček
(Charles University Prague, Czech Republic)

Devised towards geophysical applications for modeling of the solid Earth, a model of poro-elastodynamics with inelastic strains and with convection/ diffusion of water will be formulated fully in the Eulerian setting. There, concepts of gradient of the total strain rate as well as the additive splitting of the total strain rate are used, eliminating the displacement from the formulation. It relies on that the elastic strain is small while the inelastic and the total strains can be large. The energetics behind this model is derived and used for analysis as far as the existence of global weak energy-conserving solutions concerns. In some aspects, it improves a model of V. Lyakhovsky at al. to make it thermodynamically consistent and amenable for analysis. Coupling with the fluidic parts of the Earth is also possible while using the concept of elastic (so-called semi-compressible) fluids. Also magnetic phenomena will be discussed both in the solid and the fluidic parts, i.e. paleomagnetism and Earth dynamo, respectively. The talk reflects a collaboration with Giuseppe Tomassetti (Univ. Roma Tre).