Geophysical Research Abstracts, Vol. 8, 02278, 2006
SRef-ID: 1607-7962/gra/EGU06-A-02278

Spherical-harmonic finite-element approach to present-day mantle convection: preliminary results for a three-dimensional viscosity model

N. Tosi, Z. Martinec

GeoForschungsZentrum Postdam, Section of Geodesy and Remote Sensing, Potsdam, Germany.

We present a spherical-harmonic finite-element approach to the forward modelling of present-day mantle convection. The steady-state Stokes problem for an incompressible viscous flow in a spherical shell is reformulated in weak sense by means of a variational principle. The integral equations obtained are then parametrized by vector and tensor spherical harmonics in the angular direction and by piecewise linear finite elements over the radial direction. The solution is obtained using the Galerkin method, that leads to solving a system of linear algebraic equations.

This technique allows us to treat lateral-viscosity variations of several orders of magnitude. We present some preliminary results for the case of an Earth characterized by a fully three-dimensional viscosity structure.