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A new form of the dynamics equation of Maxwellian visco-elastic media

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Dynamical property of the earth's interior down to the core-mantle boundary has so far been considered to be a Maxwellian visco-elastic medium. It behaves as an elastic body for short time-scale phenomena, while on a very long time-scale it shows fluid-like behavior. So the Navier-Stokes equation for viscous fluids is considered to be appropriate for describing mantle convection, and numerical simulations have been made based on the equation.

As a phenomenon for which both elastic body property and viscous fluid property are essential post-glacial uplift has been discussed based on the constitutive equation proposed by Maxwell. However, so far most of studies apply Laplace transform to expressing time evolution, so it is not possible to treat this problem by use of finite difference method, just like general circulation models of atmosphere and oceans. Thus it is not possible to extend numerical simulation of mantle convection to include elastic property of the plate near the earth's surface.

With intention to overcome this difficulty to enable us to conduct numerical simulations of mantle-plate general circulation, a new formulation of dynamics equations for Maxwellian visco-elastic media is attempted in this study

Keywords: Maxwellian visco-elsatic media, visco-elastic medium dynamics, mantle convection, plate-mantle coupling simulation