

## An alternative formulation of the dynamics equation system of Maxwellian viscoelastic media

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The traditional dynamics equation system for Maxwellian viscoelastic media is re-examined to find an alternative form which has clearer and sounder physical basis. In the alternative formulation, in the equation of motion only elastic stress should be considered regardless of time scales, while the constitutive equation should be rewritten into such an alternative form that expresses transformation of elastic strain into permanent (plastic) strain with a time constant of the Maxwell relaxation time. Generally for long time scale phenomena, the equation system expresses gradual transformation of elastic strain into permanent strain by always keeping quasi-elastostatic balanced state. Particularly in incompressible case, the system becomes mathematically equivalent with the equation of viscous fluid motion, if the changing rate of elastic to permanent displacement is identified with fluid velocity. Practical method to time-integrate the equation system is investigated. Guided by the new formulation and underlying conception questionable points in traditional treatments of geophysical dynamics are discussed.

Keywords: plate-mantle coupled system dynamics, mantle convection, Maxwellian viscoelastic medium, viscoelastic medium dynamics, elastico-plastic medium dynamics