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Quasi-static internal deformation fields due to a dislocation source in a multi-layered elastic-viscoelastic half-space

Y. Fukahata (1,2) and M. Matsu'ura (1)

(1) University of Tokyo, Japan, (2) University of Oxford, UK (fukahata@eps.s.u-tokyo.ac.jp / Fax: +44-1865-272072)

We obtained the general expressions of internal displacement and stress fields due to a point dislocation source in a multi-layered elastic half-space under gravity. Most previous expressions of the internal deformation fields have been obtained by applying either of two different types of Thomson-Haskell propagator matrix; that is, the up-going propagator matrix proposed by Singh (1970) and the down-going propagator matrix proposed by Sato (1971). The solution derived with the up-going propagator matrix is stable below the source, but becomes unstable above the source. On the other hand, the solution derived with the down-going propagator matrix is stable above the source, but becomes unstable below the source. We succeeded in unifying the up-going and the down-going propagator matrices into a generalized propagator matrix, and applied it to obtain the general expressions that are stable at any depth. In general, the viscoelastic solution can be obtained from the associated elastic solution by applying the correspondence principle of linear viscoelasticity. We show the algorithm to obtain the internal deformation fields from the derived elastic solution for a multi-layered elastic-viscoelastic half-space, by improving the method developed by Matsu'ura et al. (1981). In the presentation, we give also some examples of internal displacement fields computed with the obtained expressions.

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