Calculation of Body Force Equivalents from the Permanent Deformation Field: An Application of FORMAC

By

Edo Nyland

*Institute of Geophysics and Planetary Physics, University of California,
Los Angeles, Calif., U.S.A.*

The body force equivalents describing an earthquake may be constructed as a sum of point forces and couples in the zero-frequency approximation. Provided that a minimum of information about the focal mechanism is available, it is possible to express the permanent deformation near the focal region as a linear sum of the deformations due to these elementary sources and to determine the coefficients in this sum uniquely from observed permanent displacements. If the locations in space of the body force equivalents are unknown, there are many possible solutions to this inverse problem.

The inversion can be programmed. The algebra involved in these calculations is tedious; however, the analysis can for the most part be carried out by computer. Using FORMAC, the necessary subroutines can be generated in a straightforward way.

A preliminary calculation has been made using geodetic data from the Dixie Valley earthquake. If the environment for the calculation is assumed to be a homogeneous halfspace, models of greater complexity than double couples are necessary to explain the observed surface deformation.

(Received Dec. 16, 1968)