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Phenomenological Representation of Seismic Sources

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All the usual phenomenological representations of earthquake sources can be obtained from the stress glut, the difference between the elastic model stress tensor field and the true physical stress tensor field. For thermoelastic sources the stress glut is an ordinary function; for faults it is a singular distribution whose support is the fault surface. The equivalent force distribution is the negative divergence of the stress glut. The polynomial moments of the equivalent force and the stress glut are the two types of seismic moment tensors. The force moments are completely determined by the motion and the glut moments are not. If all the force moments are known, the motion is completely determined, and if all the glut moments are known the source is completely determined, along with the force moments and the motion. Contrary to some published work, the seismic moment tensor is not the integral of the stress drop, and the equivalent force is not the negative divergence of the stress drop. The most general point source has as stress glut a finite linear combination of derivatives of delta functions. It can be used to approximate real localized sources. There are point sources which produce no motion. Mechanisms exist by which a real fault may produce a seismic moment tensor with nonzero trace. Real faults probably can be represented as simple surface sources, a generalization of dislocation sources, but less inclusive than De Hoop sources.

References

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The Influence of the Core and the Oceans on the Chandler Wobble

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Elastic-gravitational normal mode theory is used to investigate the dynamical influence of the fluid outer core on the free wobble of a rotating, ellipsoidal Earth model which does not have surficial oceans. A self-consistent equilibrium tidal theory is then employed to determine the passive influence of the associated pole tide on this mode. These calculations yield the observed Chandler