

The fundamental nature of a transient elastic response to prompt gravity perturbations

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Seismic waves radiated from an earthquake cause the redistribution of mass in the Earth, which in turn induces prompt elastogravity perturbations at all distances before the first arrival of seismic waves. Here we derive an analytic solution for the transient elastic response to prompt elastogravity perturbations induced by a portion of earthquake mass redistribution in an infinite homogeneous isotropic non-self-gravitation elastic medium. This solution discloses the fundamental nature of a so-far unnoticed unusual net-inner-force-free deformation regime that emerges between the onset of an earthquake and P-wave arrival, which we find inherent in action at a distance with the inverse-square law. Our analysis provides physical insights into why a gravimeter installed in the Earth is characterized by significantly decreased sensitivity to earthquake-induced prompt elastogravity perturbations. Reference: Kame, N & M. Kimura, The fundamental nature of a transient elastic response to prompt gravity perturbations, *GJI*, **218(2)**, 2019, 1136–1142, doi:10.1093/gji/ggz196

