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Acceleration Wavefronts in Random Media

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In contradsitinction to deterministic continuum mechanics, we consider wavefronts whose thickness is smaller than the Representative Volume Element (RVE) size. As a result, the wavefront is an object more appropriately analyzed as a Statistical Volume Element rather than an RVE., and therefore to be treated via a stochastic, rather than a deterministic, dynamical system. There are two entirely new aspects considered in the present study. One is the coupling of fields of material spatial randomness to the wavefront amplitude: as the amplitude grows, the wavefront gets thinner tending to a shock, and thus the material heterogeneity shows up as an ever ‘stronger’ random field. The second new facet is the explicit consideration of randomness and various cross-correlations of the instantaneous modulus, the dissipation coefficient, the instantaneous second-order tangent modulus, and the reference state mass density.

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