

Abstract Submitted
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Physics behind the transition of fatigue deformation to fatigue fracture¹ SANICHIRO YOSHIDA, Southeastern Louisiana University — A recent gauge theory of deformation and fracture has been used to consider the physics behind the transition from fatigue deformation to fatigue fracture of solids. The present field theory describes deformation and fracture of solid comprehensively as wave dynamics. The wave equations derived by this field theory have been numerically solved to assimilate the wave characteristics observed in the displacement field with experimental results. The numerical results indicate (a) the transition to fatigue fracture is initiated by the loss of Poissons effect and (b) reduction in shear modulus leads to temporal instability in the wave dynamics. This temporal instability seems to cause exponential growth of displacement field that eventually generates material discontinuity.

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