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Investigation of Shock Induced Amorphization in Metallic Single Crystals[1] CELIA GARCIA AMPARAN, RAMON RAVELO, Physics Department, University of Texas, El Paso, TX 79968 — Recent large-scale non-equilibrium molecular dynamics simulations of shock propagation in metals (Cu, Al, Ta) have shown melting at the shock front for temperatures much lower than the equilibrium melt temperature of the material, at the corresponding shock pressure. The nature of this phenomenon can be associated with amorphization of the material brought about by the loss of shear rigidity at the very high elastic deformations reached in the pressure range where this phenomena is observed. In this work amorphization is examined by evaluating phonon dispersion and sound velocities in single crystal Copper as a function of compressive strain along the (110) direction. Phonon instabilities were characterized by eigenmodes which describe the behavior of the system in a coordinate space. We show that above a critical strain, the shear modes become imaginary, indicating a dynamical instability in the wave propagation of shear waves in the sample.

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