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Numerical Modeling of Shock-Induced Damage Beneath Impact Craters HUIRONG-ANITA AI, THOMAS AHRENS, Caltech, CALTECH SHOCKWAVE LAB TEAM — The mechanical response of rocks under dynamic loading is a complex yet not very well understood phenomenon due to the difficulty of finding proper strength model for geologic materials. Recently AUTODYN-2D is used to simulate the shock-induced damage in a 20x20x15 cm granite block impacted by a lead bullet at 1.2 km/s and the result is compared with experiment data. The Johnson-Holmquist constitutive model for brittle materials, which describes the deviatoric straining in brittle media such as ceramic, is chosen to represent the shear strength of granite. A tensile crack softening model is coupled to simulate the propagation of radial tensile cracks generated by the principal tensile stress perpendicular to the shock front. The tensile stress is assumed to be equal to the deviatoric stress at radii that experience less than the HEL stress. The simulated deformation is also compared with that using CTH and only the JH model. The latter shows that damage for this shot is overestimated, which can be explained by the incapability of JH model to simulate both deviatoric and tensile cracks inducd in brittle rocks under impact.

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