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Scaling Relationships and Dynamic Failure ROGER MINICH, MUKUL KUMAR, Lawrence Livermore National Lab — Dynamic failure is modeled as a driven nonlinear dissipative system, which manifests pattern formation and scaling reminiscent of critical phenomena. Statistical fluctuations play a key role in bridging length and time scales from the atomic level to the macroscopic scales observed in laser and gas-gun experiments. The statistical fluctuations are manifested in observed experimental scaling laws. The theoretical approach is briefly reviewed and tested computationally against gas gun experiments that suggest a scaling law for the relationship between dynamic strength and void nucleation and growth rate for Cu single crystals, silica doped Cu single crystals and Cu polycrystals of different grain sizes. Additionally, we observe a sharp contrast in the rebound signal in the velocity-time trace from single crystals and polycrystalline samples. This will be examined in detail and discussed in the context of an apparent rate dependence of the void growth process. This work was performed under the auspices of the U.S. Department of Energy by the University of California, Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.

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