Title:
Smoothed Particle Hydrodynamics as a tool for modeling material strength and failure.

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Abstract:
Meshless hydrodynamics methods such as Smoothed Particle Hydrodynamics (SPH) offer interesting advantages and challenges for studying problems involving material strength, fragmentation, and failure. The primary advantages of SPH for studying the breakup of solids are that it is a robust Lagrangian technique and it does not assume a fixed topology. The robust Lagrangian nature allows SPH to evolve history variables tied to the mass (such as the deviatoric stress, strain, and damage) without introducing artificial diffusion of these properties due to advection or remapping, avoiding the complexities of numerically mixed material properties. The lack of a fixed topology also naturally allows for gaps to open in materials, proceeding to the formation of distinct fragments which detach and evolve independently. I will discuss current work we are pursuing modeling the fragmentation and breakup of solids using SPH, including comparison of our results with some recent experiments.