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Multiphase flow description of material pulverization¹ DUAN ZHANG, XIA MA, BALAJI JAYARAMAN, Los Alamos National Laboratory — Material failure and crack growth are traditionally studied in solid mechanics. However, rapid material failure often results in growth of numerous cracks and pulverization of a material. Before pulverization, the motion of the material is described by the set of equations for solid. After pulverization, if the size of the debris piece is sufficiently small, the effect of surrounding media, such as air and water, is important, and the motion of the material is often modeled as a disperse multiphase flow. Numerical simulation of the process encounters two significant challenges. The first challenge is quite practical. That is how to interface a solid code with a fluid code. The second challenge is more subtle and difficult. That is how to describe the transition from a continuum to a granular state, and provide a proper initial condition for the multiphase calculation. In this talk, we first introduce a framework of equations capable of describing the entire pulverization process based on multiphase flow formulation, and then a numerical method capable of unifying solid and fluid calculations. Despite the need to study suitable closure models for the equations, in this talk we present a few numerical examples that have been obtained by using simple closure relations.

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