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Single-equation versus multi-equation models in simulation of material flows XIA MA, DUAN ZHANG, PAUL GIGUERE, QISU ZOU, Los Alamos National Laboratory — When considering interactions of two pieces of different materials, often a single momentum equation is used; and different materials are treated as two different species of a solid material. The stress in the momentum equation is calculated differently depending on the material occupying the point. This approach is limited when considering breakup of the materials into pieces with typical size smaller than numerical grid resolution. After the breakup, one would prefer to use a two-equation model to simulate the flow of the debris of the two solid materials. It is a significant issue when and how to switch from single-equation mode to the two-equation model. A different approach is to start with a two-equation model, and to treat the system as continuous two-phase system before the material breakup. When material breakup happens, the equation system has a smooth transition into disperse two-phase flows. The issue is then, how this two-equation approach compared with the single equation approach before the material breakup. What material interaction model is needed for such numerical calculation? The present paper tries to answer some of these questions using numerical examples.

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