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Riemann Solver for the Nigmatulin Model of Two-Phase Flow KAUSHIK BALAKRISHNAN, JOHN BELL, Lawrence Berkeley National Laboratory, ALLEN KUHL, WILLIAM HOWARD, Lawrence Livermore National Laboratory — The two-phase model of Nigmatulin (Dynamics of Multiphase Media, 1991) is revisited and a second order Godunov solver is constructed for the corresponding Riemann problem using a seven wave structure. This model differs from the well established Baer-Nunziato model in that it treats the solid phase as incompressible, and also accounts for thermal as well as elastic energies for the solid phase. Numerical results are presented for three classes of Riemann problems, demonstrating the accuracy of the method. The effect of inter-granular stress on the flow physics is investigated and it is shown that this term affects the effective stiffness of the two-phase mixture, resulting in faster wave speeds for higher stresses. In addition, the numerical methodology is tested for Shock Dispersed Fuel-type problems, and the results establish robustness of the solver for the investigation of high-speed, two-phase flow.

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