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A numerical study of initial-stage interaction between shock and particle curtain[1] XIAOLONG DENG, LINGJIE JIANG, Beijing Computational Science Research Center — High speed particulate flow appears in many scientific and engineering problems. Wagner et al. 2012 studied the planar shock - particle curtain interaction experimentally, found the movement and expansion of the particle curtain, together with the movement of shock waves. Theofanous et al. 2016 did similar experiments, discovered a time scaling that reveals a universal regime for cloud expansion. In these experiments, both the particle-fluid interaction and the particle-particle collision are not negligible, which make it challenging to be dealt with. This work aims to numerically study and understand this problem. Applying the stratified multiphase model presented by Chang & Liou 2007 and regarding one phase as solid, following Regele et al. 2014, we study the initial stage of a planar shock impacting on a particle curtain in 2D, in which the particles can be regarded as static so that the collision between particles are not considered. The locations of reflected shock, transmitted shock, and contact discontinuity are examined. The turbulent energy generated in the interacting area is investigated. Keeping the total volume fraction of particles, and changing the particle number, good convergence results are obtained. Effective drag coefficient in 1D model is also calibrated.

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