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Formation mechanism of the shock-induced particle jetting KUN XUE, Beijing Institute of Technology — Granular shells or rings dispersed by the impulsive shock loadings disintegrate into macroscopic particle agglomerates which soon protrude into particle jets. Predicting the number of shock-induced particle jets requires the knowledge of the formation mechanism of the particle jetting. We carried out the numerical simulations of the shock dispersal of the semi-two dimensional particle rings using the discrete element method. The simulations reveal a two-staged jetting formation process. The first phase features the transition of the homogeneous particle flows to the localized shear flows which are the precursors of the incipient jets. The incipient jets undergo the substantial annihilation. The number of jets equals to the number of incipient jets subtracted by that of eliminated ones. The former depends on the heterogeneous structure of the network of force chains which is a function of the perimeter of the inner surface, the packing density and the material properties. The latter is determined by the shock loading, the packing density and the thickness of the ring. A physics based model has been proposed to account for the number of jet, which formularizes the initiation and the elimination processes of the incipient jets.

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