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Performance of Erosion and Cohesive Methods in Predicting Fragmentation of Metallic Composites[1] S. K. DWIVEDI, A. A. REINERT, D. STAMATIS, H. ARBELO-LOPEZ, NSWC Indian Head EOD Technology Division; Research, Development, Test and Evaluation Department; Materials Science Branch, Indian Head, MD 20640 — Modeling fragmentation with size and momenta of fragments in reasonable agreement with experimental data is one of the key requirements for simulating the performance of fragmenting metallic composites (FMC). The present work models fragmentation by erosion and cohesive methods available in LS-DYNA. The shock response of FMC, witness plate during the primary impact- penetration, and anvil material for the secondary impact are described by the Johnson-Cook strength model for deviatoric and Mie-Gruneisen equation-of-state for volumetric responses. The fragmentation by erosion method uses effective plastic strain as well as maximum principal stress criteria for eroding FMC elements. The cohesive method uses irreversible mixed mode cohesive constitutive model along grain boundaries where uniform grain size is the assumed minimum fragment size. Results are presented comparing the fragment size, size distribution, and momenta post primary impact-penetration and secondary impact. The results being obtained in this ongoing work show that the cohesive method, though computationally intensive, is more suitable to model fragmentation due to the conservation of mass, momentum and energy.

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