SPACE DEBRIS SYMPOSIUM (A6)
Hypervelocity Impacts and Protection (3)

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NUMERICAL SIMULATION OF ACOUSTIC EMISSION SIGNAL PRODUCED BY HYPERVELOCITY IMPACT OF PROJECTILE ON ALUMINUM PLATE

Abstract

All spacecraft in low orbit are subject to hypervelocity impacts by meteoroids and space debris. These impacts can damage spacecraft flight critical systems, which can in turn lead to catastrophic failure of the spacecraft. In order to ensure the astronauts safety and spacecraft normal operation, the design of sensor systems to detect impact impacts on spacecraft become an important problem of spacecraft design. The numerical simulations of acoustic emission (AE) signals produced by projectile hypervelocity impact on Aluminum plate at normal have been carried out using the SPH (smoothed particle hydrodynamics) technique of AUTODYN hydro-codes in this paper. The results using two dimensional simulations are given. The effect of impact velocity, impact distance, projectile mass, Aluminum plate thickness, momentum and kinetic energy etc. on AE signals has been investigated. The simulation results are compared with experimental results, and the simulated impact failure modes shapes and the frequency characteristics of AE signals are consistent v with experimental results.