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Simulation of Hyper-Velocity Impact of a Micro-Particle on Layered Shield Configurations- An Image Article

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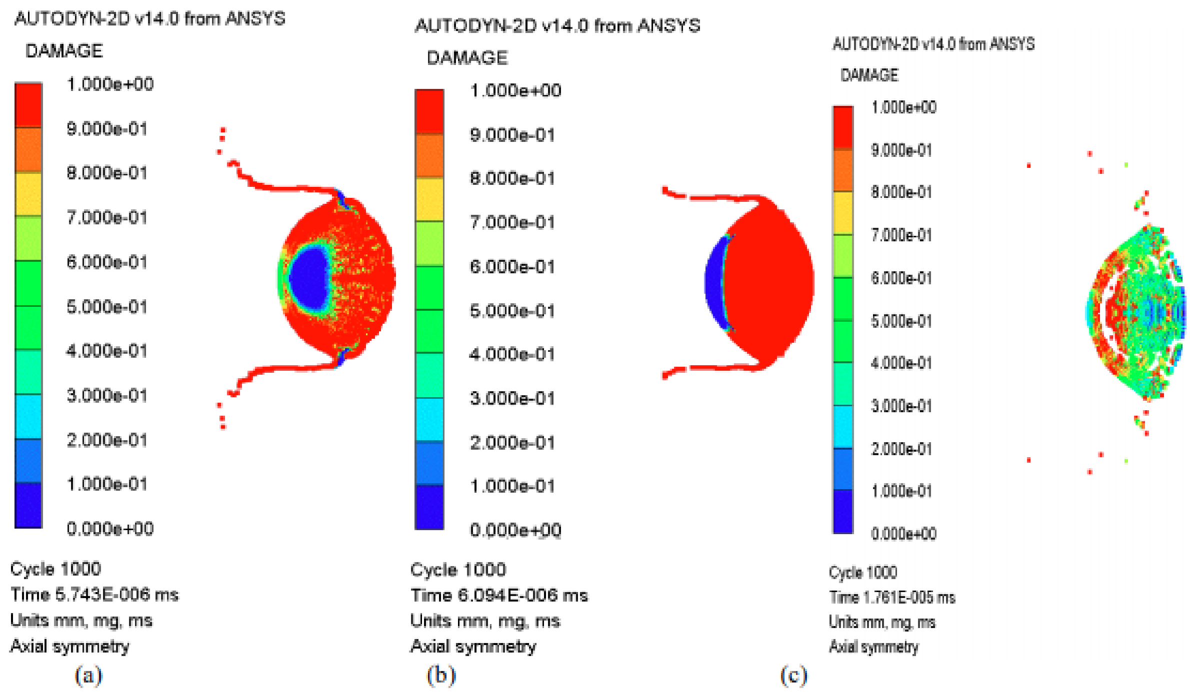
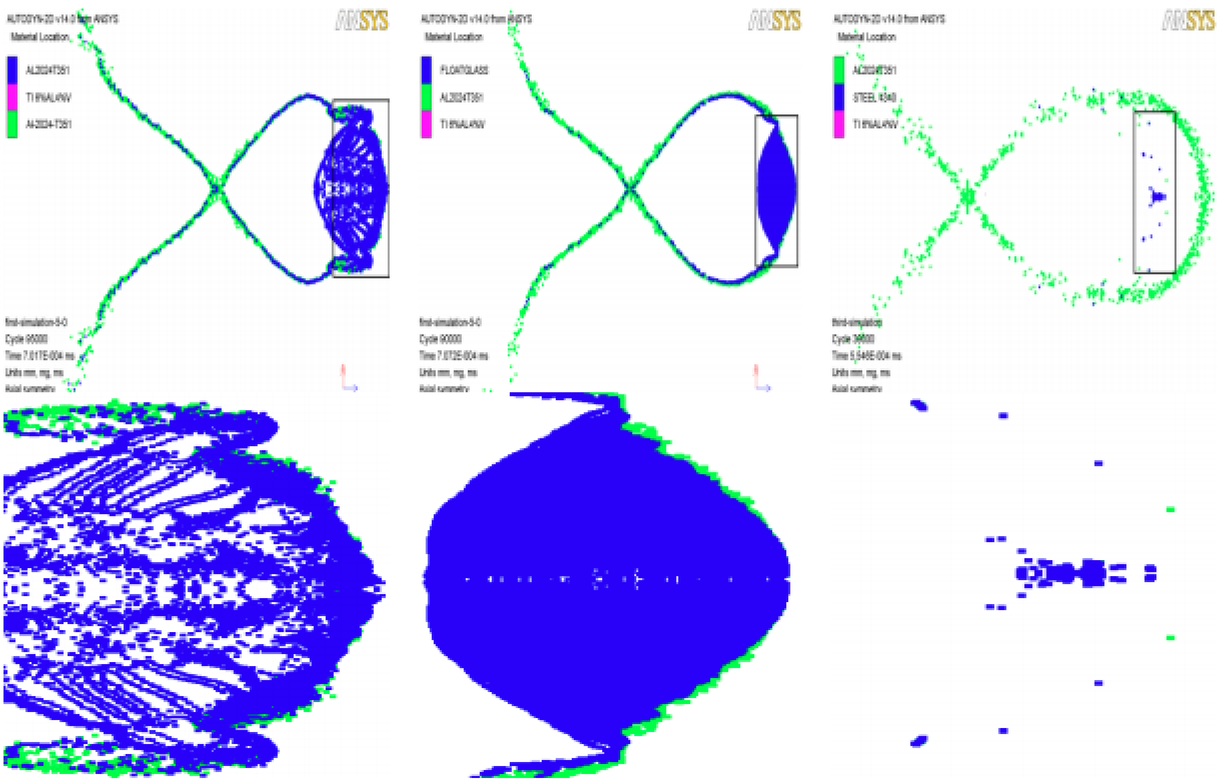
Keywords/Scope

A Numerical investigation is administered to assess the performance of layered shield configurations against hypervelocity impact of a micro-particle nominally travelling at the speed of a 7.3 km/s. Most micro-particles in space either contains or possess characteristics almost like aluminum, float glass, and steel particles. Therefore, these three materials are utilized in this numerical investigation as impactors shielded by a layered configuration.



The DC shape in all three cases is ellipsoidal, which mainly consists of fragments from the first bumper foil and is independent of its thickness. The only evident change is the shape of the front fragment cloud which might be possible due to the duration of the interaction.

The hollow spherical shape is evident in the first case, which illustrates even distribution of the fragments and the energy dispersion, while in the second case the fragments are accumulated at the center. In the third case, the first foil is incapable of fragmenting the impacting MP.



0.7µs 0.7µs 0.55µs

The bumper foil is ultra-thin and composed of multiple layers of particles. Upon interaction, a compression wave is produced in the foil, and this compression brings particles closer and raises the pressure on the surface of the foil and within the MP also .

The wave propagates through the fabric and changes the speed of the particles, which influences strain and stress states of the fabric . within the first case, MP (aluminum) has an equivalent density because the first bumper foil where some hollow shape may

be seen inside the DC