

## A Dislocation-Based Explanation to Quasi-Elastic Release in Shock Loaded Aluminum

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**Abstract :** An explanation is introduced to study the quasi-elastic release phenomenon in shock compressed aluminum. A dislocation-based model, taking into account of dislocation substructures and evolutions, is applied to simulate the elastic-plastic response of both single crystal and polycrystalline aluminum. Simulated results indicate that dislocation immobilization during dynamic deformation results in a smooth increase of yield stress, which leads to the quasi-elastic release. While the generation of dislocations caused by plastic release wave results in the appearance of transition point between the quasi-elastic release and the plastic release in the profile. The quantities of calculated shear strength and dislocation density are in accordance with experimental result, which demonstrates the accuracy of our simulations.

**Keywords :** dislocation density, quasi-elastic release, wave profile, shock wave

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