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Influence of Grain Boundary Properties on Spall Strength SARYU FENSIN, STEVE VALONE, ELLEN CERRETA, GEORGE GRAY, Los Alamos National Laboratory — There are many factors thought to affect the spall strength of a grain boundary, including: grain boundary structure, energy, and excess volume, in addition to its interactions with dislocations. In this work, we explore the affect of average and local properties on the spall strength of a grain boundary. The average properties explored in this work include grain boundary energy and excess volume while local properties include plastic work at grain boundary. Flyer plate simulations were carried out for five boundary types with different structures, energies and excess volumes. These boundaries were chosen as model systems to represent various boundaries observed in “real” materials. Simulations indicate that there is no direct correlation between the spall strength of a boundary and either its energy and excess volume. This result suggests that average properties of grain boundaries alone are not sufficient indicators of the spall strength of a boundary and perhaps local boundary properties need to be taken into account to predict boundary spall strength. In fact, better correlation was found between the ability of a boundary to undergo plastic deformation and spall strength.

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