Abstract Submitted
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One-Dimensional Simulations for Spall in Metals with Intra- and Inter-grain failure models[1] BRIAN FERRI, School of Mechanical Engineereing, SUNIL DWIVEDI, School of Materials Science and Engineering (Former), DAVID MCDOWELL, School of Mechanical Engineereing, Georgia Institute of Technology, Atlanta, GA 30332 — The objective of the present work is to model spall failure in metals with coupled effect of intra-grain and inter-grain failure mechanisms. The two mechanisms are modeled by a void nucleation, growth, and coalescence (VNGC) model and contact-cohesive model respectively. Both models were implemented in a 1-D code to simulate spall in 6061-T6 aluminum at two impact velocities. The parameters of the VNGC model without inter-grain failure and parameters of the cohesive model without intra-grain failure were first determined to obtain pull-back velocity profiles in agreement with experimental data. With the same impact velocities, the same sets of parameters did not predict the velocity profiles when both mechanisms were simultaneously activated. A sensitivity study was performed to predict spall under combined mechanisms by varying critical stress in the VNGC model and maximum traction in the cohesive model. The study provided possible sets of the two parameters leading to spall. Results will be presented comparing the predicted velocity profile with experimental data using one such set of parameters for the combined intra-grain and inter-grain failures during spall.

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