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1D Continuum and 2D Mesoscale Simulations of Plate Impact Spall Experiments in 6061-T6 Aluminum S.K. DWIVEDI, J.N. JOHNSON, Y.M. GUPTA, Institute for Shock Physics, Washington State University — A comprehensive study has been initiated to understand the spallation of 6061-T6 aluminum in plate impact experiments, and to relate the features in pull-back velocity profile to material damage. Plate impact spall experiments at three stress levels 4.1 GPa, 13.7 GPa, and 21 GPa with two sample thicknesses at 4.1 GPa were simulated using Johnson's void growth and coalescence model in a 1D wave code COPS. The results show that the model allows determination of a common set of parameters (with some tolerance) that simulates pull-back velocity profile for all the four experiments. More importantly, the maximum tensile stress at the spall plane is higher than the spall threshold stress calculated from the pull-back velocity and does not increase with thickness reduction. These phenomena are under further study through 2D mesoscale simulations which are known to predict quasi-elastic unloading without shear modulus degradation as needed in 1D COPS. Results from 1D COPS and 2D mesoscale simulations will be compared to highlight the material phenomena. Work supported by DOE.

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