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Interpretation of pull-back signals at incipient spall in pure aluminum using unit cell model[1] Y.G. WANG, Ningbo University, Zhejiang 315211, P.R. China, M.L. QI, Wuhan University of Technology, Wuhan 430070, P.R. China, H.L. HE, Institute of Fluid Physics,CAEP, Mianyang 621900, P.R. China — Planar impact spall experiments of pure aluminum have been preformed with the different impact velocities ranging from 196 to 236 m/s, which is necessary to induce the incipient spall conditions. Both velocity profiles at the rear surface and optical metallographic of soft-recovered samples are obtained. In order to reveal the physical mechanism of pull-back signals at incipient spall, numerical investigations with the FE commercial code LS-DYNA have been carried out using a simple unit cell model to describe the damage evolution. The simulated free surface velocity profiles and relative void volume for different impact velocities are in very good agreement with the experimental data. By analyzing stress decay in the matrix surrounding the growing voids, it is validated that the occurrence of pull-back signals is due to the influence of damage kinetics on wave dynamics. Meanwhile, the dependence of the amplitude of the pull-back velocity on damage is explored.

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