

Abstract Submitted
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Dissociation along the principal Hugoniot of plastic ablator materials GAEL HUSER, PIERRE COLIN-LALU, VANINA RECOULES, GWENAEL SALIN, CEA DAM DIF, NORIMASA OZAKI, KOHEI MIYANISHI, Osaka University, TAKAYOSHI SANO, YUUICHI SAKAWA, ILE Osaka, ERIK BRAMBRINK, TOMMASO VINCI, BOLIS RICCARDO, LULI Ecole Polytechnique — Plastic materials are used as ablators in Inertial Confinement Fusion capsules for the National Ignition Facility and Laser Mégajoule. First-principles ab initio simulations of Glow discharge polymer hydrocarbon (GDP-CH) as well as Si-doped GDP-CH principal Hugoniot curves up to 8 Mbar were performed using the quantum molecular dynamics (QMD) code Abinit and showed that atomic bond dissociation increases the compressibility, which is not taken into account by average-atom models. Results from these simulations are used to parameterize a quantum semi-empirical model in order to generate a tabulated Equation of State (EOS) that includes dissociation. Hugoniot measurements obtained from experiments conducted at LULI2000 and GEKKOXII laser facilities confirm QMD simulations as well as EOS modeling. Our model also applies to reanalyzed data of other plastic materials and its influence on shock timing is evaluated using hydrodynamic simulation.

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