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Constitutive modelling of shock response of PTFE ANATOLY RESNYANSKY, Weapons Systems Division, Defence Science and Technology Organisation, Edinburgh SA 5111, Australia, NEIL BOURNE, JEREMY MILLETT, Atomic Weapons Establishment, Aldermaston, Reading, RG7 4PR, Berkshire, United Kingdom, ERIC BROWN, MST-8, MS G-755, Los Alamos National Laboratory, Los Alamos, NM 87545, USA — The PTFE (polytetrafluoroethylene) material is complex and attracts attention of the shock physics researchers because it has amorphous and crystalline components. In turn, the crystalline component has four known phases with the Phase II-to-III transition in shock waves. At the same time, as has been recently studied using spectrometry, the crystalline region is growing with load as well. Stress and velocity shock-wave profiles acquired recently with embedded gauges demonstrate features that may be related to impedance mis-matches between the regions subjected to some transitions resulting in density and modulus variations. We consider the above mentioned amorphous-to-crystalline transition and the high pressure Phase II-to-III transitions as possible candidates for the analysis. The present work utilizes a multi-phase rate sensitive model to describe shock response of the PTFE material. One-dimensional shock wave experimental profiles are compared with calculated profiles with the kinetics describing the transitions. The objective of this study is to understand the role of the various transitions in the shock response of PTFE.

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