

A PREDICTIVE MODEL FOR HIGH RATE EQUATIONS OF STATE FOR POLYMERS

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Prediction of the high strain rate response of polymer and polymer-composite materials is necessary in a variety of important defence and industrial applications. The response of such materials is dominated by the interchain van de Waal's bonding and this implies that a general form for the pressure-volume relation should exist. Well-validated molecular modelling has allowed the form of such relations to be explored. A simple analytical relation that links pressure, volume and energy for polymers via a generalised potential function is presented and demonstrated for materials of interest. The parameters used in the relation can all be determined from the chemical structure of the polymer, and additivity rules are used to apply the model to composites (such as unreacted PBX material) from its components. Good agreement with experimental data is found.