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Shock Properties of Anisotropic Polymers GARETH TEAR, DANIEL EAKINS, DAVID CHAPMAN, WILLIAM PROUD, Institute of Shock Physics, Imperial College London — The effect of anisotropy in polymer materials caused by the alignment of polymer chains during manufacture and processing has been previously investigated at low strain rates by multiple authors, however the effect of molecular orientation at higher strain rates and shock loading is an area of active research. This work presents experimental results on the effect of molecular orientation on shock propagation in polycarbonate. The Us – Up Hugoniot has been measured for varying degrees of chain alignment. Polycarbonate is an amorphous polymer which does not exhibit cross-linking, allowing the study and modeling of the material to be simplified. Birefringence is used to study the initial anisotropy of the material before loading. During loading optical techniques are used to characterize shock behavior, namely line VISAR, Het-V/PDV and high-speed imaging. The influence of chain orientation on birefringence will be discussed, in particular the effectiveness of high speed imaging in conjunction with birefringence as a method of qualitatively analyzing shock induced anisotropy in optically transparent polymers.

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