

Abstract Submitted
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High Strain Rate Response of an Epoxy and a Vinyl Ester¹ RODNEY J. CLIFTON, PETCH JEARANAISILAWONG², TONG JIAO, Brown University — Pressure-shear plate impact experiments are used to study the nonlinear dynamic response of an epoxy and a vinyl ester at shearing rates of $10^5 - 10^6 \text{ s}^{-1}$. Samples with thicknesses in the range $10\mu\text{m} - 100\mu\text{m}$ are formed between two hard steel plates. Because of its higher wave speed, the longitudinal wave generated at impact reaches the sample first and, after a few reverberations through the thickness of the sample, subjects the sample to a uniform state of uniaxial strain compression. Then the shear wave arrives and imposes a simple shearing deformation. From the transverse velocity, measured interferometrically at the rear surface of the sandwich target, one obtains the shearing resistance of the material under pressure. Because the sample bonds to the bounding plates, the shearing of the sample continues even after longitudinal unloading waves arrive from the rear surface of the target and reduce the nominal pressure in the sample to zero. Thus, from a single experiment, one obtains the response of the sample in simple shear – both under pressure and without pressure. From such experiments a pressure-sensitivity of the inelastic shearing resistance is found for both the epoxy and the vinyl ester.

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