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The effect of particle reinforcement on the dynamic deformation of polymer-based composites BRADLEY W. WHITE, NARESH N. THADHANI, Georgia Institute of Technology, JENNIFER L. JORDAN, AFRL/RWME Eglin AFB, FL, JONATHAN E. SPOWART, AFRL/RXLMD Wright-Patterson AFB, OH — Multiphase composite materials consisting of one or more types of particle reinforcements in a polymer matrix are being studied to determine the effect of reinforcement on the dynamic yield strength and critical impact velocity for plastic deformation. Casting was used to prepare epoxy composites with varying particle loading fractions (10 – 50 Vol%), size (5 and 50 μm), and type (Al or Ni+Al). The cast samples were tested at strain rates in the range of 10^3 to 10^4 s^{-1}, using a 7.62 mm gas gun with a rod-on-anvil (Taylor) impact experimental setup. The recovered impacted specimens were analyzed to determine the dimensions of their deformed and undeformed regions. The yield strength and critical velocity for plastic deformation were evaluated using Hutching's analysis [J Mech Phys Solids, vol. 26, 1979] and correlated with quantitative characteristics of the size and distribution of the reinforcement phase(s).

Bradley W. White
Georgia Institute of Technology

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