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Meso-scale simulations of particle reinforced epoxy-based composites BRADLEY W. WHITE, Georgia Institute of Technology, H. KEO SPRINGER, Lawrence Livermore National Laboratory, JENNIFER L. JORDAN, AFRL/RWME, Eglin AFB, JONATHAN E. SPOWART, AFRL/RXLMD, Wright-Patterson AFB, NARESH N. THADHANI, Georgia Institute of Technology — Polymer matrix composites reinforced with metal powders often exhibit complex microstructure characteristics that can vary greatly due to differences in particle size and distribution, morphology, loading fractions, and composite processing methods. The effects of these differences in underlying microstructure on the mechanical and wave propagation behavior of these composites under dynamic loading conditions are not well understood. To better understand these effects, epoxy (Epon826/DEA) reinforced with different particle loading fractions of aluminum (20 or 40% vol.), nominal particle size of aluminum (5 or 50 microns), and the addition of a stiffer second particle type (Ni, 10% vol., 50 micron nominal diameter) were prepared. Microstructures of the as cast composites were obtained and used in two dimensional meso-scale simulations. The effect of varying velocity loading conditions ($>$ 400 m/s) on the wave velocity was then examined to determine the Us –Up response as a function of composite configuration. In this presentation results from the meso-scale simulations will be shown and correlated to microstructure characteristics.

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