The effects of uncertainty in material constituents on the mechanical response and failure of laminated composites under high strain rate loading are studied. A stochastic multiscale framework capable of transferring relevant information across the length scales is used. A previously developed strain rate dependent sectional micromechanics model is extended to account for the variability in microstructure and constituent material properties. The sectional micromechanics address the full three-dimensional deformation of the material. A progressive failure theory, based on a previously modified Hashin failure criterion, is incorporated in the multiscale model. A Latin hypercube sampling technique is used to model the uncertainties in fiber volume fraction and viscoplastic material constants. Comparisons can be made with experimental data to verify the validity of the stochastic multiscale model. The multiscale model is implemented within explicit finite element software to simulate impact response of laminated composites. Parametric studies are conducted to investigate the effect of uncertainty on the residual energy of a composite laminate during impact.

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