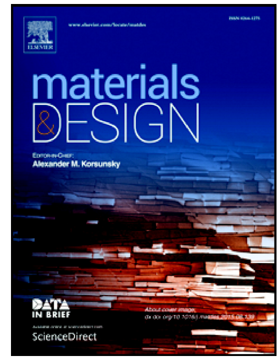

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Abstract

The effects of braided architecture and co-braided hybrid structure on the tensile response of carbon-aramid hybrid three-dimensional (3D) braided composites are investigated experimentally in this paper. Four kinds of specimens with different braided architectures or different co-braided hybrid structures were produced. The elastic properties and surface deformation of hybrid 3D braided composites were measured under axial tensile loading to failure utilizing the Digital Image Correlation (DIC) technique. The surface full-field strain contours indicate that the high strain aeras are distributed at the braiding yarns. Both the highest tensile strength and modulus of specimens are achieved by hybrid three-dimensional five-directional (3D5d) braided composites with carbon fibers as axial yarns. While, both the maximum ultimate tensile strain and Poisson's ratio are achieved by hybrid 3D5d braided composites with aramid fibers as axial yarns. The fracture morphologies of samples show that the fracture patterns of hybrid composites depend on both braided architecture and co-braided hybrid structure. The carbon-aramid co-braided hybrid 3D braided composites can be developed with strength and toughness properties far superior to those of their individual constituents.