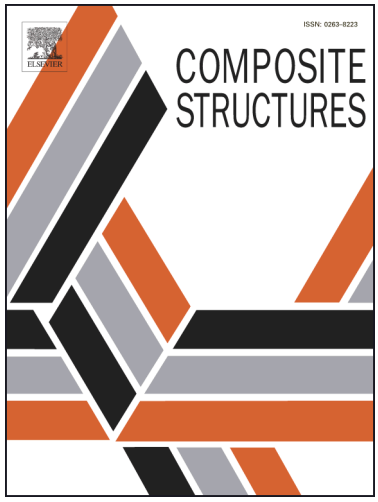


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# Effects of z-pin's porosity on shear properties of 2D C/SiC z-pinned joint

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Abstract

In this paper, 2D C/SiC z-pinned joint is prepared via chemical vapor infiltration. Effects of z-pin's porosity on shear properties of z-pinned joint are investigated from the failure mode and the shear damage mechanisms. The results show that the average joint shear strength decreases asymptotically from 249.9 MPa to 97.2 MPa as the total porosity of 2D C/SiC z-pin increases from 14.4% to 27.3%. For each porosity, the joint shear strength is between the tensile strength and the in-plane shear strength of 2D C/SiC, which is rationalized by the rigid body sliding model of 2D C/SiC. Because high porosity leads to large rotational deformation of transverse fibers, a critical porosity about 17.7% is observed from shear-controlled failure to bending-controlled failure. A cohesive fracture model is developed to build the relation between the joint shear strength and the mechanical properties of 2D C/SiC. Very good accuracy is obtained.

Keywords: A. Ceramic-matrix composites (CMCs); B. Mechanical properties; B.

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