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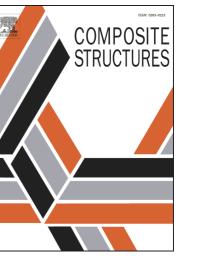
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ACCEPTED MANUSCRIPT

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

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Abstract 6

In this paper, 2D C/SiC z-pinned joint is prepared via chemical vapor infiltration. 7 8 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 9 joint shear strength decreases asymptotically from 249.9 MPa to 97.2 MPa as the total 10 porosity of 2D C/SiC z-pin increases from 14.4% to 27.3%. For each porosity, the 11 joint shear strength is between the tensile strength and the in-plane shear strength of 12 2D C/SiC, which is rationalized by the rigid body sliding model of 2D C/SiC. 13 Because high porosity leads to large rotational deformation of transverse fibers, a 14 critical porosity about 17.7% is observed from shear-controlled failure to 15 bending-controlled failure. A cohesive fracture model is developed to build the 16 relation between the joint shear strength and the mechanical properties of 2D C/SiC. 17 Very good accuracy is obtained. 18

Keywords: A. Ceramic-matrix composites (CMCs); B. Mechanical properties; B. 19

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