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A new model of interfacial adhesive strength of fiber-reinforced polymeric composites upon consideration of cohesive force

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Abstract: Interfacial adhesive strength model for fiber-reinforced polymeric composites is investigated based on the cohesive-zone model of interface and mesomechanics analysis. The constitutive relation for the polymer matrix is assumed to be a linear viscoelastic one, and the fiber is considered as a rigid body. According to the principle of energy conservation and Eshelby's equivalent inclusion method, The interfacial debonding between the fiber and matrix is analyzed, and a new interfacial adhesive strength model is suggested. It is found that the interfacial adhesive strength has singularity with respect to the radius, *R*, of the fiber, but it is not *R*~(-1/2) singularity. The effects of the Poisson's ratio of matrix, debonding angle, relaxation time of matrix, and the radius of the fiber are all numerically discussed. It is found that owing to exist of cohesive force, the strength is greater than that without considering such a cohesive force.

Keywords: Polymer composites; Fiber; Debonding; Damage mechanics; Cohesive force; Interface fracture

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