World Academy of Science, Engineering and Technology
International Journal of Electrical and Computer Engineering
Vol:11, No:07, 2017

Micromechanical Analysis of Interface Properties Effects on Transverse Tensile Response of Fiber-Reinforced Composites

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Abstract : A micromechanical analysis of the influence of fiber-matrix interface fracture properties on the transverse tensile response of fiber-reinforced composite is investigated. Augmented finite element method (AFEM) is used to provide high-fidelity damage initiation and propagation along the micromechanical analysis. Effects of fiber volume fraction and fiber shapes are also studies in representative volume elements (RVE) to capture the stochastic behavior of the composite under loading. In addition, defects and voids influence on the composite response are investigated in micromechanical analysis. The results reveal that the response of RVE with constant interface properties overestimates the composite transverse strength. It is also seen that the damage initiation and propagation locations are controlled by the distributions of fracture properties, fibers' shapes, and defects.

Keywords : cohesive model, fracture, computational mechanics, micromechanics
Conference Title : ICEME 2017 : International Conference on Electrical and Mechanical Engineering
Conference Location : Istanbul, Türkiye
Conference Dates : July 27-28, 2017