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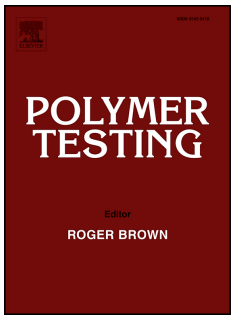

Effect of shape memory alloy wires on the enhancement of fracture behavior of epoxy polymer

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Property Modelling

Effect of shape memory alloy wires on the enhancement of fracture behavior of epoxy polymer

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Abstract

The effect of embedded shape memory alloy (SMA) wires on the fracture behavior of epoxy resin was studied. A micromechanical model was developed to predict the double cleavage drilled compression (DCDC) test results for SMA reinforced epoxy specimens. The DCDC tests were performed on SMA reinforced epoxy and the fracture behavior of specimens with different crack lengths was investigated. The experimental tests were conducted on the specimens with 1%, 2% and 4% pre-strain levels in order to investigate the enhancement of crack growth resistance (K_R) in the epoxy polymer. The effects of SMA wire diameter, temperature change and applied pre-strain level on the fracture behavior of SMA reinforced epoxy were studied using the present model. The results showed a 67% increase in the changes in the crack growth resistance (ΔK_R) in 1% pre-strained SMA reinforced epoxy subjected to temperature change from 25 ^{o}C to 65 ^{o}C. This improvement was 38% and 16% for the 2% and 4% SMA pre-strained reinforced epoxy, respectively. The results also revealed that, at constant temperature (T= 65 ^{o}C), 2% and 4% pre-strains improved (ΔK_R) of epoxy by 2 and 4 times, respectively, in comparison

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