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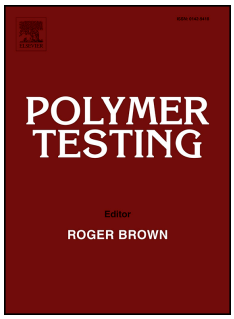

Tensile behavior of quasi-unidirectional glass fiber/polypropylene composites at room and elevated temperatures

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Abstract

In the present study, the tensile behavior of quasi-unidirectional glass fiber/polypropylene composites at room and elevated temperatures were investigated by both micro- and macromechanical test methods. In the micromechanical studies, a single fiber fragmentation test was employed for measuring the interfacial shear strength at fiber-polypropylene interface in the temperature range from 23 ℃ to 90 ℃. The results show that interfacial shear strength decreases with increasing testing temperature. In the macromechanical studies, experimental results show that the elastic modulus of polypropylene and transverse elastic modulus of composites are sensitive to the testing temperature. The weakened fiber- polypropylene interface due to elevated temperatures led to the vanishing of ``knee`` in transverse tensile stress-strain curves. A function was proposed to evaluate the dependence of the elastic modulus of quasi-unidirectional glass fiber/polypropylene composites on the testing temperatures and tested against experimental data. Tensile failure mechanisms of composites were demonstrated to evolve with the testing temperature.

Keywords: composites; tensile behavior; elevated temperature; fiber-matrix interface