

Experimental Assessment of Micromechanical Models for Mechanical Properties of Recycled Short Fiber Composites

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Abstract : Processing of polymer fiber composites has a remarkable influence on their mechanical performance. These mechanical properties are even more influenced when using recycled reinforcement. Therefore, we place particular attention on the evaluation of micromechanical models to estimate the mechanical properties and compare them against the experimental results of the manufactured composites. For the manufacturing process, an epoxy matrix and carbon fiber production cut-offs as reinforcing material are incorporated using a vacuum infusion process. In addition, continuous textile reinforcement in combination with the epoxy matrix is used as reference material to evaluate the kick-down in mechanical performance of the recycled composite. The experimental results show less degradation of the composite stiffness compared to the strength properties. Observations from the modeling also show the same trend as the error between the theoretical and experimental results is lower for stiffness comparisons than the strength calculations. Yet still, good mechanical performance for specific applications can be expected from these materials.

Keywords : composite recycling, carbon fibers, mechanical properties, micromechanics

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