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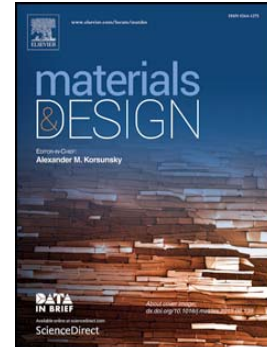
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**Three-dimensional modeling and experimental validation of thermomechanical response of FRP composites exposed to one-sided heat flux**

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**Abstract:** The heat transfer, gas diffusion process and thermomechanical deformation are generally coupled and associated with the chemical decomposition for fiber reinforced polymer composites at elevated temperatures. The three-dimensional (3-D) governing differential equations for the coupled temperature-diffusion-deformation problem of porous elastomers were developed. The thermomechanical behavior of a silica/phenolic composite material was predicted using the mathematical model. The spatially dependent temperature and pore pressure, displacement, and stress contours of silica/phenolic composites exposed to one-sided radiant heat flux were investigated. Based on the digital image correlation technique, a non-contact high temperature deformation measurement test was conducted. The temperature profiles were measured by the thermocouples embedded in different depths of the specimen, while the full-field displacements and strains were provided by correlating the two digital images of the specimen surface in the un-deformed and deformed states, respectively. The accuracy of the proposed model was assessed by comparing the predicted temperatures and displacements with experimental values for the same boundary and initial conditions.

**Keywords:** Polymer-matrix composites; Thermomechanical behavior; High temperature deformation;

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