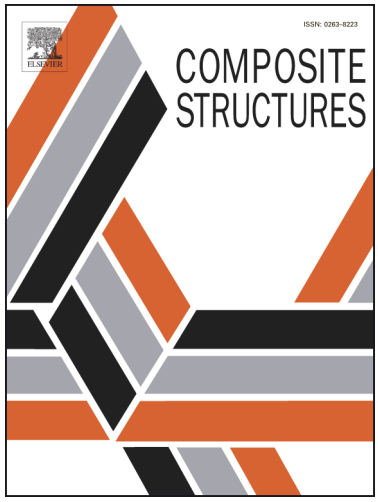

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Anisotropic hyper-viscoelastic behaviors of fabric reinforced rubber composites

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Abstract

In this paper, an anisotropic hyper-viscoelastic constitutive model considering the temperature effect for the reticulated fabric reinforced rubber composites is developed. First, the hyperelastic part presents the effects of fiber fabric and the interaction between the rubber and the fiber fabric; the viscoelastic part is described by Prony series functions, also the temperature effect on the mechanical response for the fabric reinforced rubber composites is considered in the hyper-viscoelastic constitutive model. Second, the material parameters of the constitutive model are determined by means of fitting the test results of the rubber and the fabric reinforced rubber composites. Finally, the proposed constitutive model is used to simulate the compression and the relaxation response of fabric rubber seal, which is in good agreement with the corresponding experimental results. The study will provide an effective model to characterize and predict the hyperelastic and viscoelastic behaviors of fabric reinforced rubber composites at different temperatures.

Key words: Hyper-viscoelasticity; Constitutive model; Fabric reinforced rubber composites; Temperature effect