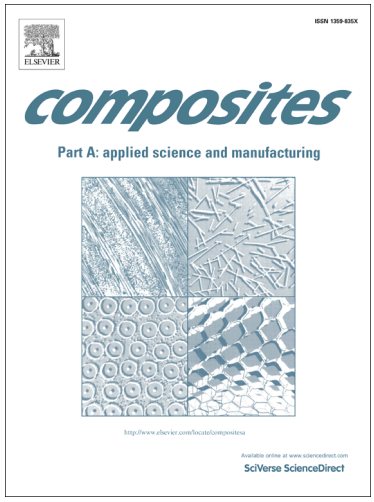
Accepted Manuscript



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PII: S1359-835X(14)00138-9
DOI: http://dx.doi.org/10.1016/j.compositesa.2014.05.003
Reference: JCOMA 3618

To appear in: *Composites: Part A*

Received Date: 7 January 2014
Revised Date: 3 May 2014
Accepted Date: 6 May 2014

Please cite this article as: Qiao, T., Liu, L., Liu, Y., Leng, J., Thermal mechanical constitutive model of fiber reinforced shape memory polymer composite: Based on bridging model, *Composites: Part A* (2014), doi: http://dx.doi.org/10.1016/j.compositesa.2014.05.003

Thermal mechanical constitutive model of fiber reinforced shape memory polymer composite: based on bridging model

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Abstract

The ever increasing applications of Shape Memory Polymers (SMPs) and its Composites (SMPCs) have motivated the development of appropriate constitutive models. In this work, based on composite bridging model, a constitutive model for unidirectional SMPCs under thermal mechanical loadings in the small strain range has been developed. The composite bridging model has been adopted to describe the distribution of stress-strain between fiber reinforcement and SMPs matrix. Besides, considering the influence of fiber content and temperature, the storage and release of "frozen strain", the recovery of stress has been quantified as well. The stress-strain curves of SMPCs laminate under axial tensile indicate that the theoretical data derived from the developed model are basically accordant with the experimental data, and that the proposed model is suitable for machining practice. Furthermore, the model has been applied to predict stress recovery, strain storage and releasing with changing of temperature.

Keywords: Carbon-carbon composites (CCCs), Thermomechanical, Computational modeling.