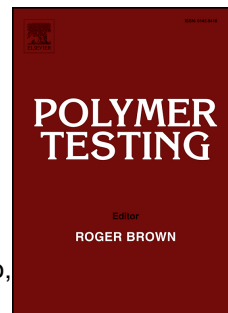


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Uniaxial tensile tests and dynamic mechanical analysis of satin weave reinforced epoxy shape memory polymer composite

Jianhui Hu^{a,b,c*}, Wujun Chen^a, Pengxuan Fan^a, Jifeng Gao^a, Guangqiang Fang^d,
Zhengli Cao^d, Fujun Peng^d

^a Space Structures Research Center, Shanghai Jiao Tong University, Shanghai 200240, China.

^b State Key Laboratory of Ocean Engineering, Shanghai 200240, China

^c Collaborative Innovation Center for Advanced Ship and Deep-Sea Exploration, Shanghai 200240, China

^d Aerospace System Engineering Shanghai, Shanghai, 201108, China

E-mail address of the corresponding author: jtuhjh@gmail.com;

Telephone number: +86 021-62932191; Fax number: +86 021-62932193

Abstract: The utilization of epoxy shape memory polymer composite (SMPCs) as engineering materials for deployable structures has attracted considerable attention in recent decades due to high strength and satisfactory stiffness in comparison with shape memory polymers (SMPs). Knowledge of static and dynamic mechanical properties is essential for analyzing structural behavior and recovery properties, especially for new epoxy SMPCs. In this paper, a new weave reinforced epoxy shape memory polymer composite was prepared with satin weave technique and resin transfer molding technique. Uniaxial tensile tests and dynamic mechanical analysis were carried out to obtain basic mechanical properties and glass transition temperatures, respectively.

The tensile strength and breaking elongation of warp specimens were relatively lower than those of weft specimens due to yarn number and weave geometry. The increment of elastic modulus and hysteresis loop areas became smaller with loading cycles, meaning that cyclic tests could obtain approximate stable mechanical properties. For dynamic mechanical properties, glass transition temperature (T_g) obtained from storage modulus curves was lower than that determined from tan delta curves and T_g s in the warp and weft directions were comparable (29.4 °C vs 29.7 °C).

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