

عنوان مقاله:

Determination of tensile and flexural mechanical properties of polymer nanocomposites, by a non-linear damage model and experimental study

محل انتشار:

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خلاصه مقاله:

The present paper aims to study the effects of different mass fractions of silica nanoparticles on the tensile, compressive, and flexural mechanical properties of polymer composites via experimental methods and non-linear damage model. Epoxy polymers consist of two parts: the first part has a low viscosity, ML-506, as the epoxy base, and the second part contains a polyamide as a hardener, HA-11. Spherical silica nanoparticles with four different mass fractions of 0, 0.2, 0.5 and 1 % are dispersed into the epoxy polymer system under two different ultrasonic times. The tensile and flexural mechanical properties of the prepared samples are determined using standard tests. Experimental measurements show that the mechanical properties of polymer composites improve with increasing mass fraction of nanoparticles. In addition, increasing the ultrasonic time from half-an-hour to one hour is further improves the mechanical properties of polymer composites. A non-linear damage model based on the Weibull theory is used to interpret the flexural stress-strain relationships of the tested materials. The parameters in this model are tensile modulus E , Weibull scale parameter σ_0 and Weibull shape parameter β . A good agreement is seen between the results of the stress-strain curve obtained from the above mentioned model and experimental results.

کلمات کلیدی:

(Polymer, Composites, Stress/Strain relationship, Non-linear Damage Model, Scanning Electron Microscopy (SEM)

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