EFFECT OF MOISTURE ABSORPTION ON THE FLEXURAL PROPERTIES OF CARBON NANOTUBES MODIFIED EPOXY/BASALT COMPOSITES

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1. Abstract
It is known that moisture absorption has an influence on the mechanical properties of epoxy/basalt composites. For a present study, the effect of moisture absorption on the flexural behaviors of carbon nanotubes (CNTs) modified epoxy/basalt (epoxy/CNT/basalt) composites was investigated. Epoxy/basalt woven composites and epoxy/CNT/basalt composites were fabricated by incorporating woven type basalt fibers into epoxy matrix modified with 1 wt.% acid-treated multiwalled carbon nanotubes (MWCNTs). Both composites were immersed in distilled water for 4 months. For both composites, three-point bending tests have been performed on the dry and fully moisture-absorbed samples. The results showed that addition of CNTs has little effect on the absorption of epoxy/basalt composites. The results also showed that the flexural modulus and strength of epoxy/CNT/basalt composites were greater than those of epoxy/basalt composites, irrespective of moisture absorption. Particularly, the flexural modulus and strength of moisture-absorbed samples were 20% and 30% smaller, respectively than those of dry samples. Scanning electron microscope (SEM) examination on the fractured surfaces showed that the decrease of flexural properties of moisture-absorbed samples occurred due to the due to weak interfacial bonding between the CNTs and epoxy as well as basalt fibers and epoxy as a result of the swelling of epoxy matrix.

References