

عنوان مقاله:

INVESTIGATION OF CRACK RESISTANCE IN SINGLE WALLED CARBONNANOTUBE REINFORCED POLYMER COMPOSITES BASED ON FEM

محل انتشار:

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خلاصه مقاله:

Carbon nanotube (CNT) is considered as a new generation of material possessing superior mechanical, thermal and electrical properties. The applications of CNT, especially in composite materials, i.e. carbon nanotube reinforced polymer have received great attention and interest in recent years. In this paper the inter-atomic interactions of CNT are simulated by beam elements in the finite element (FE) model. Non-linear spring-based line elements are employed to simulate the van der Waals bonds. The stress intensity factor of nanocomposites are evaluated using a representative volume element (RVE) based on the continuum mechanics and FEM. Three fracture modes (Opening or tensile mode, Shearing or sliding mode, Tearing or out-of-plane mode) are considered. In all fracture modes the stress intensity factor determined for pure matrix and matrix reinforced with SWCNT. Numerical results show that the load carrying capacities of the CNTs in a matrix are evident. Addition of CNTs in a matrix can increase the stiffness of the composite. Comparison of results showed that utilizing of SWCNT decreased the stress intensity factor and improved crack resistance.

کلمات کلیدی:

Stress intensity factor; Fracture modes; Nanocomposite; Carbon nanotubes; Finite element model

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