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Interface characteristics of carbon nanotube reinforced polymer composites using an advanced pull-out model. (English) [Zbl 1398.74050](#)
Comput. Mech. 53, No. 2, 297-308 (2014).

Summary: An advanced pull-out model is presented to obtain the interface characteristics of carbon nanotube (CNT) in polymer composite. Since, a part of the CNT/matrix interface near the crack tip is considered to be debonded, there must present adhesive van der Waals (vdW) interaction which is generally presented in the form of Lennard-Jones potential. A separate analytical model is also proposed to account normal cohesive stress caused by the vdW interaction along the debonded CNT/polymer interface. Analytical solutions for axial and interfacial shear stress components are derived in closed form. The analytical result shows that contribution of vdW interaction is very significant and also enhances stress transfer potential of CNT in polymer composite. Parametric studies are also conducted to obtain the influence of key composite factors on bonded and debonded interface. The result reveals that the parameter dependency of interfacial stress transfer is significantly higher in the perfectly bonded interface than that of the debonded interface.

MSC:

- [74E30](#) Composite and mixture properties
- [74R05](#) Brittle damage
- [81T10](#) Model quantum field theories
- [74A50](#) Structured surfaces and interfaces, coexistent phases
- [81R99](#) Groups and algebras in quantum theory

Keywords:

polymer composites; stress transfer; debonded interface; analytical pull-out model; van der Waals interaction

Full Text: [DOI](#)

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