FINITE ELEMENT ANALYSIS OF THE EFFECT OF CONTACT FORCES IN HEAT CONDUCTION OF COMPOSITE MATERIALS

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Current study uses a thermomechanical surface contact finite element formulation for analyzing interfacial heat conductance in correlation to Carbon Nanotubes contact forces. The atomic lattice of CNTs is initially modeled using the molecular structural mechanics approach and reduced to an equivalent 2D continuum element. The equivalent 2D continuum element is used as a robust and efficient surrogate model for the construction of full length CNTs in contact. Coupled structural and heat pde's have been used to describe the corresponding thermomechanical problem which are discretized using 2D quadrilateral finite elements, along with surface contact elements. The problem was solved using a Newton-Raphson incremental-iterative scheme. Extensive sensitivity analysis was performed with respect to a number of influencing parameters, such as initial contact angle, boundary conditions and CNT overlapping.

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