

Torsional Vibration of Carbon Nanotubes via Nonlocal Gradient Theories

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Abstract : Carbon nanotubes (CNTs) have many possible application areas because of their superior physical properties. Nonlocal Theory, which unlike the classical theories, includes the size dependency. Nonlocal Stress and Strain Gradient approaches can be used in nanoscale static and dynamic analysis. In the present study, torsional vibration of CNTs was investigated according to nonlocal stress and strain gradient theories. Effects of the small scale parameters to the non-dimensional frequency were obtained. Results were compared with the Molecular Dynamics Simulation and Lattice Dynamics. Strain Gradient Theory has shown more weakening effect on CNT according to the Stress Gradient Theory. Combination of both theories gives more acceptable results rather than the classical and stress or strain gradient theory according to Lattice Dynamics.

Keywords : torsional vibration, carbon nanotubes, nonlocal gradient theory, stress, strain

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