

Static and Dynamic Analysis of Timoshenko Microcantilever Using the Finite Element Method

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Abstract : Micro cantilevers are one of the components used in the manufacture of micro-electromechanical systems. Epoxy microcantilevers have a variety of applications in the manufacture of micro-sensors and micro-actuators. In this paper, the Timoshenko Micro cantilever was statically and dynamically analyzed using the finite element method. First, all boundary conditions and initial conditions governing micro cantilevers were considered. The effect of size on the deflection, angle of rotation, natural frequencies, and mode shapes were then analyzed and evaluated under different frequencies. It was observed that an increased micro cantilever thickness reduces the deflection, rotation, and resonant frequency. A good agreement was observed between our results and those obtained by the couple stress theory, the classical theory, and the strain gradient elasticity theory.

Keywords : microcantilever, microsensor; epoxy, dynamic behavior, static behavior, finite element method

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