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Abstract

Nonlocal theories of Continuum Mechanics are widely used in order to assess size effects in nano-structures. In this paper, free vibrations of nano-beams are investigated by making recourse to the novel stress-driven nonlocal integral model (SDM). Equations of motion governing the dynamics of a Bernoulli-Euler nano-beam are consistently formulated and numerically integrated by Matlab. Selected case studies involving structures of nanotechnological interest are examined. Natural frequencies, evaluated according to the SDM, are compared with those obtained by the Eringen differential law (EDM) and by the gradient elasticity theory (GradEla). SDM provides an effective methodology to describe nonlocal phenomena in NEMS.

Key words: A. Nano-structures, B. Elasticity, Free Vibrations, NEMS.