

**ACOUSTICS2008/185**  
**Resonant frequencies of a cantilevered timoshenko beam with an  
attached general point-connected vibratory system**

Robert Koch

NUWC, 1176 Howell Street, Code 8232, Bldg. 1302, Newport, RI 02841-1708, USA

The literature is full of technical papers that have examined the free vibration of cantilevered Bernoulli-Euler beams with both rigidly and elastically-attached point masses at the free end. Additionally, much work has been published in the last ten years on cantilevered Timoshenko beams (which includes the effects of shear deformation and rotatory inertia) with a similar, yet more restricted, set of free end boundary conditions. Rossit and Laura published in the Journal of the Acoustical Society of America in 2001 a formulation for a Timoshenko beam with a simple single DOF spring-mass system attached to the free end. The present paper extends Rossit and Laura's mathematical formulation to account for a general, damped, multi-DOF system point-connected to a cantilevered Timoshenko beam's free end. To demonstrate the formulation, mathematical relations and numerical results for a single DOF damped system and both damped/undamped 2DOF vibration absorbers are presented.