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Electrical Detection of Resonance in a Helically Coiled Carbon Nanowire DOYL DICKEL, DEEPIKA SAINI, BALU PILLAI, HERBERT BEHLOW, MALCOLM SKOVE, APPARAO RAO, Clemson University — Helically coiled Carbon Nanowires (HCNWs) are promising elements, both for their promise as components for NEMS devices as well as for fundamental research. This is due primarily to their exotic geometry. We present here the electrostatic excitation of a HCNW cantilever to resonance and an entirely electrical measurement of the same using harmonic detection of resonance (HDR). The correlation between the directly observed resonance and the electrical signal is shown and, in addition to calculating a lateral spring constant from the observed resonance frequency, we examine the nonlinear behavior of the HCNW when driven to large amplitudes of vibration. Specifically, elliptical oscillation is visually evident and we have measured the electrical response of the corresponding combination mode.

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