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Electrical Detection of Oscillations in Micro- and Nano-Cantilevers GAYATRI KESKAR, JAY GAILLARD, RASVAN CIOCAN, MALCOLM SKOVE, APPARAO RAO, Clemson University — Electrical Detection of Oscillations in Micro- and Nano- Cantilevers We described a fully electrical actuation and detection method for measuring mechanical oscillations in ambient conditions for two systems: Si-based micro- and multi-walled carbon nanotube (MWNT) based nano-cantilevers. In our studies, a cantilever is either a silicon microstructure shaped like a diving board, or a cantilevered MWNT. The cantilever is placed parallel to and within 1-10 μm from a counter electrode and is forced into resonance by applying an ac voltage (V_{ac}) with a dc offset (V_{dc}) on the counter electrode under ambient conditions. We measure the magnitude and phase of the electrical signal due to the charge induced on the cantilever. The signal showing the resonance frequency of the cantilever is best measured at harmonics of V_{ac}. A model describing the response of our electrical actuation and detection of resonance oscillations will be presented.

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