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**Operation of a Nanoelectromechanical Resonator Embedded in a Phase Locked Loop Circuit** TAEJOON KOUH, KAMIL L. EKINCI, Aerospace and Mechanical Engineering Dept., Boston University — Recently, a great deal of experimental and theoretical interest has been directed towards sub-micron resonant mechanical devices. These Nanoelectromechanical Systems (NEMS) are interesting for probing fundamental phenomena at the nanoscale and may serve in a number of important technological applications. One of the remaining engineering challenges in the domain of NEMS is the integration of NEMS resonators with feedback and frequency control systems. Here, we describe the operation of a NEMS resonator embedded in a phase locked loop circuit. The doubly-clamped beam NEMS resonators in this work are operated in their fundamental flexural modes — their motion actuated electrostatically and transduced optically. Such schemes for phase locked operation of NEMS resonators offer opportunities in the development of NEMS based frequency control devices, and various mechanical and biological sensors. This project is supported by the NSF under grants No. 0216274 and 0324416.

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