Abstract Submitted
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Optical detection of thermal noise modes in torsional microelectromechanical oscillators[1] VINCENT VLAMINCK, JEFFREY R. GUEST, DARIO ANTONIO, DANIEL LOPEZ, JOHN E. PEARSON, AXEL HOFFMANN, Argonne National Laboratory — We present the optical detection of the thermal noise spectrum for different torsional MEMS that will be implemented in a study of magnetomechanical coupling at the nanoscale. The interferometric measurement yields the differential dynamic displacement between two diffraction-limited spots on the surface to sub-pm precision, allowing us to identify the thermal modes in the low MHz frequency range. Flexion and torsional modes from thermal noise at room temperature can be distinguished by different amplitudes at different positions of the probe beam. The different mechanical eigenmodes are identified with the help of finite element simulations. This study of the thermal oscillation serves to identify the torsional mode frequencies that can be matched to low frequency magnetization dynamics of magnetic domain wall oscillators. At this point we have fabricated torsional oscillators with a resonance frequency of 6.53 MHz and a Q-factor of 1030, which are at the same time compatible with magnetic domain wall oscillators.

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