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Exploiting the Stochastic Dynamics of Microscale Cantilevers for Single Molecule Measurements MATTHEW CLARK, MARK PAUL, Virginia Tech — The stochastic dynamics of micron scale cantilevers are investigated. The fluctuation-dissipation theorem is used to describe the stochastic dynamics using deterministic numerical calculations. A quantitative description of the fluid flow around experimentally realistic microcantilevers is presented to yield a baseline description of the fluid dynamics in the regime of small amplitude oscillations at high frequencies. It is shown that a correlated measurement technique using an array of two cantilevers is capable of obtaining real-time measurements of the dynamics of single proteins. The dynamics of a protein tethered between two cantilevers will correlate the cantilever motion with a magnitude smaller than that of thermal oscillations of a single cantilever, yet larger than the coupling due to hydrodynamic effects. The dynamics of a single microscale cantilever are also investigated as the cantilever is brought closer to a solid wall. The effect of the increased dissipation associated with the presence of the wall on the first and second peaks of the noise spectrum is discussed.

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