

Abstract Submitted
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Correlation Force Spectroscopy for Single Molecule Measurements¹ MILAD RADIOM, Chemical Engineering, Virginia Tech, BRIAN ROBBINS, Mechanical Engineering, Virginia Tech, JOHN WALZ, Chemical Engineering, Virginia Tech, MARK PAUL, Mechanical Engineering, Virginia Tech, WILLIAM DUCKER, Chemical Engineering, Virginia Tech — The sensitivity of force measurements in single molecule force spectroscopy is limited by noise resulting from thermal vibration of microcantilevers as well as hydrodynamic interaction with surrounding fluid. The thermal noise is particularly important in biomolecular studies since many biomolecular events have energy similar to the thermal noise: for a cantilever of spring constant $k_s \sim 0.1\text{N/m}$ the thermal noise sets a bound on force noise level of order $(k_s k_B T)^{1/2} \sim 20\text{pN}$ where k_B and T are the Boltzmann constant and temperature. We describe a new technique which characterizes single polymer chains through measurement of correlations between thermally-stimulated vibrations of two closely spaced microcantilevers in fluid. We call this technique Correlation Force Spectrometry. CFS has lower noise than its counterpart single cantilever techniques since thermal noise in CFS only arises from the region where the two cantilevers interact due to fluid coupling, rather than from the entire cantilever. When a molecule is straddled between the two cantilevers, the correlation arises from the solvent as well as stiffness and internal damping of the molecule. We will present our results showing the effect of coupling through a single molecule of dextran.

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