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A calibration error revealed via local tip position detection in atomic force microscopy KRISHNA SIGDEL, GAVIN KING, Department of Physics and Astronomy, University of Missouri-Columbia — Atomic Force Microscopy (AFM) is a versatile tool in nanoscience. In conventional AFM, knowledge of the local 3D tip position is not accessible and tip trajectories are extrapolated from the cantilever deflection (ΔZ) which provides data of reduced dimensionality. The sensitivity (nm/V) of ΔZ is calibrated by taking slope of ΔZcurve when the tip makes contact to a surface. Using a focused laser beam directly focused on the apex of the AFM tip, we have measured 3D positions of the tip as it interacts with a sample surface in fluid. We have observed a significant difference between the slope of (ΔZ) and that of the Z-tip position. This implies an erroneous calibration of sensitivity of ΔZ detection which we can now correct. Also, we have observed significant lateral slipping of tip as it touches the surface. These observations provide a comparison between tip and cantilever dynamics.

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