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Three-axis positional drift correction in scanning probe microscopy[1] NATHAN D. FOLLIN, CHRISTOPHER J. MUSALO, MATTHEW L. TRAWICK, Department of Physics, University of Richmond, Richmond, VA — Positional drift in scanning probe microscopy can cause image distortion and metrological errors of tens of nanometers or more. It can arise from thermal drift, due to thermal expansion of materials in the sample and microscope while scanning, or from piezo creep, particularly along the z axis. We present a technique for correcting positional drift errors in all three axes. Our method works by comparing each scanned topographical image to a second, partial scan, taken immediately afterwards, on which the fast and slow scan axes have been reversed. We model the positional distortion as a low-order polynomial function in three dimensions, searching for the set of correctional coefficients that minimizes the difference between the two scans. Using this technique we have successfully reduced positional errors from 50 nm to 0.5 nm in the z axis, and from 40 nm to 2 nm (about half of a single pixel) in the xy plane.

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