Lateral force calibration in atomic force microscope using MEMS microforce sensor.

In this paper we present a simple and direct method for the lateral force calibration constant determination in atomic force microscopes. The calibration procedure does not require any knowledge about material or geometrical parameters of an investigated cantilever. A commercially available microforce sensor with precise electronics is applied for direct measurement of the friction force exerted by the cantilever's tip to a flat surface of the microforce sensor measuring beam. Due to the third law of dynamics, the friction force of the equal value tilts the AFM cantilever. Therefore, torsional (lateral force) signal is compared with the signal from the microforce sensor and the lateral force calibration constant is determined with high accuracy (about 2%). The method is easy to perform and could be widely used for the lateral force calibration constant determination in many types of atomic force microscopes.