Force microscope with capacitive displacement detection

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We developed a force microscope using a capacitively controlled lever displacement. Both mechanical construction and electronics are simple and lead to a very compact device. Different measurement modes of the microscope are described. In the constant-capacitance mode the observed capacitance between tip and sample is in the order of femtofarad. In the force mode, various tip-sample interactions are investigated under ambient air. The obtained force resolution is comparable to that of laser-controlled atomic force microscopy. As an application, the magnetic force signal between the tip and the local surface–microfield configuration of a bit structure in a magnetic recording medium was imaged.