# Intermolecular and surface forces in noncontact scanning force microscopy

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Different forces which may, in general, be present in noncontact scanning force microscopy are theoretically analyzed with respect to their typical magnitude and range. It is shown that van der Waals forces provide an ever-present contribution to long-range probe-sample interactions. If a liquid is present in the intervening gap between probe and sample, it is found that ionic double-layer forces may play an important role. If the probe is in very close proximity to the substrate, the discrete structure of intervening liquids leads to characteristic solvation forces. For liquids present as thin adsorbed films on top of the substrate, capillary forces turn out to be the source of very strong long-range probe-sample interactions.