Modelling of Atomic Force Microscopic Nano Robot's Friction Force on Rough Surfaces

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Abstract : Micro/Nanorobotics or manipulation of nanoparticles by Atomic Force Microscopic (AFM) is one of the most important solutions for controlling the movement of atoms, particles and micro/nano metrics components and assembling of them to design micro/nano-meter tools. Accurate modelling of manipulation requires identification of forces and mechanical knowledge in the Nanoscale which are different from macro world. Due to the importance of the adhesion forces and the interaction of surfaces at the nanoscale several friction models were presented. In this research, friction and normal forces that are applied on the AFM by using of the dynamic bending-torsion model of AFM are obtained based on Hurtado-Kim friction model (HK), Johnson-Kendall-Robert contact model (JKR) and Greenwood-Williamson roughness model (GW). Finally, the effect of standard deviation of asperities height on the normal load, friction force and friction coefficient are studied.