

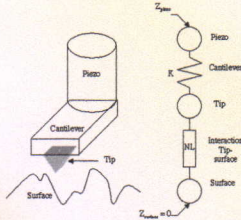
ATOMIC FORCE MICROSCOPE FUNCTIONALITY SIMULATION: PHYSICAL and ENERGETIC ANALOGIES

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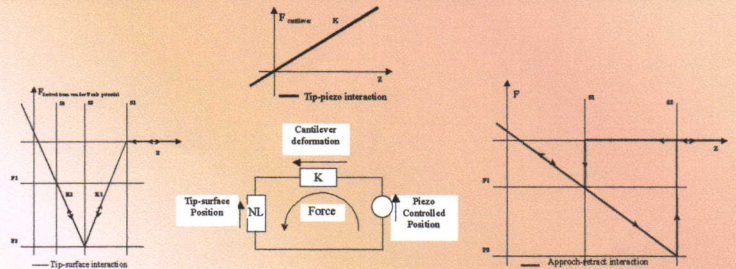


¹ Laboratoire ICA-ACROE, INPG

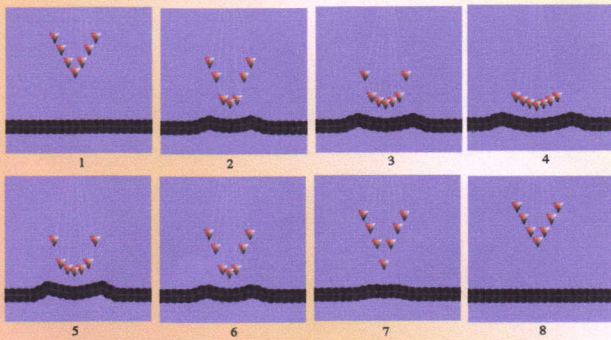
Model of the AFM components: piezo-tip-surface



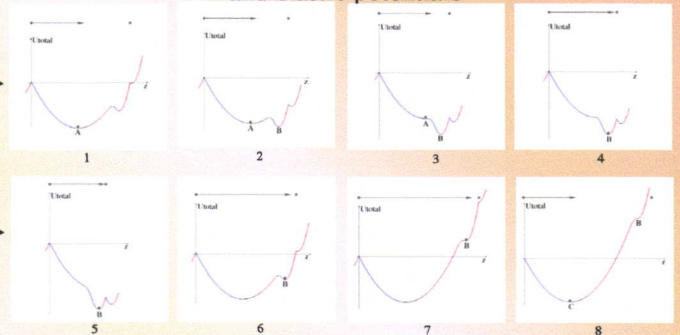
Equivalent representation of AFM in the electro-mechanical model



Model results: approach-retract interaction sequences - minimal representation



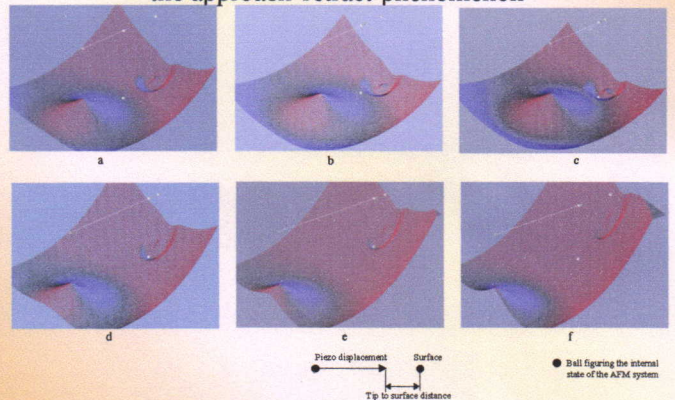
Approach-retract phenomenon: energetic analogy and its representation by the composition of Lennard-Jones and elastic potentials



Feeling the tip approach, respectively, the tip retract with a Force Feedback Gestural Device



Visual rendering based on the potential representation of the approach-retract phenomenon



CONCLUSION

We have succeeded to concept the virtual scenes based on physical models of interaction, tested in real time with a Force Feedback Gestural Device. Visual rendering based on physical and energetic analogies brings a nano-world phenomenon to our natural feelings.

References
 [1] M. Guthold, M.R. Falvo, W. Garrett and others: "Controlled Manipulation of Molecular Samples with the nanoManipulator", IEEE Trans. On Mechatronics, vol.5, No.2, June 2000
 [2] C. Cadoz, A. Luciani, J.L. Florens, "CORDIS-ANIMA: a Modeling and Simulation System for Sound and Image Synthesis: The General Formalism", CMJ vol.17/1-MIT Press, 1993
 [3] N.A. Ashcroft and N.W. Mermin, "Solid State Physics", Holt, Rinehart and Winston Rinehart and Winston publisher, 1976