Real-Time Haptic Nanomanipulation in Two and Three Dimensions

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Abstract

Nanomanipulators with haptic (force feedback) human interface must have relatively fast update rate (1–3 kHz) to provide usable interaction. This is challenging from a technical and conceptual point of view, yet we were able to implement such a system, using contact AFM. The direct interaction between an operator's hand and the AFM tip is great for education and understanding, while still allowing for interesting scientific experiments [1]. However, inherent AFM limitations such as the lack of a "pick and release" mechanism led us to design another real-time 3D nanomanipulator—this time, based on optical tweezers. We implemented real-time (1 kHz) measurements of 3x3 stiffness matrix of surrounding media. The first results from inside living cells were encouraging [2, 3].

Refrences

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