

NEAR-FIELD AND FAR-FIELD MODELLING OF SURFACE WAVES SCATTERED BY AFM TIP

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ABSTRACT. The detection of surface waves through scanning near-field optical microscopy (SNOM) is a promising technique for thermal measurements at very small scales. Recent studies have shown that electromagnetic waves, in the vicinity of a scattering structure such as an atomic force microscopy (AFM) tip, can be scattered from near to far-field and thus detected. In the present work, a model based on the finite difference time domain (FDTD) method and the near-field to far-field (NFTFF) transformation for electromagnetic waves propagation is presented. This model has been validated by studying the electromagnetic field of a dipole in vacuum and close to a dielectric substrate. Then simulations for a tetrahedral tip close to an interface are presented and discussed.

Keywords : FDTD, Near-field, SNOM