1038-78-182 **Peijun Li*** (lipeijun@umich.edu), Department of Mathematics, University of Michigan, Ann Arbor, MI 48109. A Scattering Problem in Near-Field Optics.

Near-field optics has developed dramatically in recent years due to the possibility of breaking the diffraction limit and obtaining subwavelength resolution. Broadly speaking, near-field optics concerns phenomena involving evanescent electromagnetic waves, to which the super-resolving capability of near-field optics may be attributed. In order to theoretically understand the physical mechanism of this capability, it is desirable to accurately solve the underlying scattering problems in near-field optics. The objective of this paper is to investigate the mathematical modeling for one of the important experimental modes of near-field optics, photon scanning tunneling microscopy. Variational formulations coupling a finite element method in the inhomogeneous sample with a boundary integral method on the artificial boundary are studied. The well-posedness of the continuous and discrete problems, as well as optimal error estimates for the coupled variational approximation, are established. Numerical results are included to illustrate the performance of the proposed method and to show the presence of evanescent waves in near-field optics phenomena. (Received February 08, 2008)