1092-78-63 **Gang Bao** (bao@math.msu.edu), Department of Mathematics, Zhejiang University, Michigan State University, East Lansing, MI 48824, and **Peijun Li*** (lipeijun@math.purdue.edu), Department of Mathematics, Purdue University, West Lafayette, IN 47907. *Near-Field Imaging of Infinite Rough Surfaces.*

This talk is concerned with an inverse infinite rough surface scattering problem in near-field optical imaging, which is to reconstruct the scattering surface with a resolution beyond the diffraction limit. The surface is assumed to be a small and smooth deformation of a plane surface. Based on a transformed field expansion, the boundary value problem with complex scattering surface is converted into a successive sequence of a two-point boundary value problems in the frequency domain, where an analytic solution for the direct scattering problem is derived from the method of integrated solution. By neglecting the high order terms in the asymptotic expansion, the nonlinear inverse problem is linearized and an explicit inversion formula is obtained. The method works for sound soft, sound hard, and impedance surfaces, and requires only a single illumination at a fixed frequency and is realized efficiently by the fast Fourier transform. Numerical results show that the method is simple, stable, and effective to reconstruct scattering surfaces with subwavelength resolution. (Received July 25, 2013)