

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Evaluation of nanoindentation model for viscoelastic model: Improvements to current model¹ MEIYU ZHAI, GREGORY MCKENNA, Texas Tech University — Nanoindentation is an increasingly used method of extracting surface mechanical properties of viscoelastic materials, especially polymers. Recently Hutcheson and McKenna [Phys.Rev.Lett.**94**, 07613 (2005)] used a viscoelastic contact mechanics model to analysis the contact problem between a nanosphere and polystyrene surface. In their work, the force applied on the sphere was determined by the surface tension interaction between the sphere and material surface. In nanoindentation experiments the ramp loading test is a similar problem to the particle embedment experiment except that the indentation load function differs. The motivation in this work is to explore an analysis method for indentation test based on Hutcheson and McKenna's work on particle embedment. We show that performing a test sequence that includes multiple rates of loading spanning two or more orders of magnitude greatly improves the extracted viscoelastic properties.

¹Office of Naval Research under project No.N00014-11-1-0424

Meiyu Zhai
Texas Tech University

Date submitted: 15 Nov 2013

Electronic form version 1.4