replacing MAR17-2016-009325. Also, I meant to present it as an "oral". Thank you

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New Model for Deep Indentation by Spherical AFM probes¹ KIARASH RAHMANI ELIATO, BRYANT DOSS, Department of Physics, Arizona State University, Tempe, AZ85287, USA, HARPINDER SAINI, MEHDI NIKKHAH, School of Biological and Health Systems Engineering, Arizona State University, Tempe, AZ 85287, USA, ROBERT ROS, Department of Physics, Arizona State University, Tempe, AZ85287, USA — Atomic Force Microscopy based microrheology has evolved as a key tool in the study of mechanics of biological materials. Spherical probes and contact models such as the Hertz model [1] are commonly used for soft materials, such as cells and hydrogels. Hertz model is limited to shallow indentations due to its first order geometry approximation. Deep indentation provides additional information like mechanical heterogeneity. In this study, we present a novel model using the second-order approximation of the sphere geometry and Sneddon's solution [2]. Polyacrylamide gels were used to collect experimental data both, for quasi-static (elastic moduli) and dynamic (shear storage and loss moduli) quantifications. We verified the model by finite element simulations. Our model demonstrates constant elastic moduli and more homogenous shear storage moduli up to the radius of the probe, while the elastic and shear storage modulus calculated with the Hertz model decrease with the indentation depth. Applications of this model to various hydrogels will be shown. We anticipate that the proposed model improves the precession of microrheology with spherical probes. 1. Hertz, H., J. für die R. Angew. Math. 92, 156 (1882) 2. Sneddon, I.N., Int.J.Eng.Sci 3, 47 (1965)

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