



MECHANICAL
ENGINEERING

SEMINAR

Cytoskeletal Dynamics of Human Erythrocyte

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The human erythrocyte demonstrates extraordinary ability to undergo reversible large deformation and fluidity. Such mechanical response cannot be consistently rationalized on the basis of fixed connectivity of the cell cytoskeleton that comprises the spectrin molecular network tethered to phospholipid membrane. We present a coarse-grained cytoskeletal dynamics simulation with breakable protein associations to elucidate the roles of shear stress, specific chemical agents, and thermal fluctuations in cytoskeleton remodeling. We demonstrate a clear solid-to-fluid transition depending on the metabolic energy influx. The solid network's plastic deformation also manifests creep and yield regimes depending on the strain rate. This cytoskeletal dynamics model offers a means to resolve long-standing questions regarding the reference state used in red blood cell elasticity theory for determining the equilibrium shape and deformation response.



George Lykotrafitis is a Postdoctoral Fellow in the Department of Materials Science and Engineering at the Massachusetts Institute of Technology. He received his Sc. B. in Physics from the National University of Athens and Sc. M. and Ph. D. degrees in Mechanical Engineering from the California Institute of Technology. His research interests include experimental mechanics, wave propagation in solids, mechanics of earthquake rupture, fracture mechanics, thermoelasticity, dynamic behavior of membranes, and cytoskeletal dynamics of human erythrocyte.

Thursday, FEBRUARY 28th, 2008

12:00 pm Seminar in 233 Mudd

1:00 pm Lunch in ME Lobby