

**Adam D. Mulliken, Ph.D., P.E.**  
**Senior Managing Engineer****Professional Profile**

Dr. Adam Mulliken is a Senior Managing Engineer Exponent's Technology Development practice. Dr. Mulliken's expertise is in bringing rigorous data analysis and predictive modeling to bear on problems of interest to the US military. Dr. Mulliken has applied his skills across a broad range of technologies and applications, including ground-penetrating radar, robotics and autonomous systems, automatic and aided-target recognition techniques, and transparent armor. Prior to joining Exponent, Dr. Mulliken was a Research Staff Member within the Science and Technology Division at the Institute for Defense Analyses (IDA). While at IDA, Dr. Mulliken served a variety of Department of Defense agencies by providing independent and objective evaluation of technologies in development. Dr. Mulliken was a leader for numerous field tests of vehicle-mounted sensors designed for mine and improvised explosive device (IED) detection.

Dr. Mulliken's formal training is in the mechanical behavior of materials; his doctoral thesis at the Massachusetts Institute of Technology – funded by the US Army – focused specifically on the impact behavior of engineering plastics. This thesis work included equal parts theoretical modeling, computer simulation, and high strain-rate experiments. The "Mulliken-Boyce" polymer constitutive model described in his doctoral thesis and associated journal publications has since been adopted and applied by researchers at numerous government and academic institutions.

**Academic Credentials and Professional Honors**

Ph.D., Mechanical Engineering, Massachusetts Institute of Technology, 2006  
M.S., Mechanical Engineering, Massachusetts Institute of Technology, 2004  
B.E., Engineering, Thayer School of Engineering at Dartmouth College, 2002  
B.A., Engineering Sciences, Dartmouth College (*summa cum laude*), 2002

International Journal of Solids and Structures Highly Cited Author, 2005–2008  
Foster-Miller Prize, MIT Institute for Soldier Nanotechnologies Soldier Design Competition, 2006  
First Place, Society for Experimental Mechanics International Student Paper Competition, 2004  
Thayer School of Engineering Faculty Award for Academic Excellence, 2002  
Richard W. Olmstead Engineering Sciences Prize, 2002

**Licenses and Certifications**

Registered Professional Engineer, Virginia, #048651

## **Patents**

US patent 7,472,637: Hierarchical material assemblies and articles for use in projectile impact protection, filed November 2005; issued January 2009 (Sarva S, Mulliken AD, Boyce MC, Hsieh AJ).

## **Publications**

Tsui NT, Yang Y, Mulliken AD, Torun L, Boyce MC, Swager TM, Thomas EL. Enhancement to the rate-dependent mechanical behavior of polycarbonate by incorporation of triptycenes. *Polymer* 2008; 49(21):4703–4712.

Garg M, Mulliken AD, Boyce MC. Temperature rise in polymeric materials during high rate deformation. *Journal of Applied Mechanics-T ASME* 2008; 75(1):011009.

Sarva S, Mulliken AD, Boyce MC. Mechanics of Taylor impact testing of polycarbonate. *International Journal of Solids and Structures* 2007; 44(7–8):2381–2400.

Mulliken AD, Soong SY, Boyce MC, Cohen RE. High-rate thermomechanical behavior of poly(vinyl chloride) and plasticized poly(vinyl chloride). *Journal of Physics IV* 2006; 134:217–223.

Sarva S, Mulliken AD, Boyce MC. The mechanics of large-strain inhomogeneous deformation of polymeric materials under dynamic loading conditions. *Journal of Physics IV* 2006; 135:95–101.

Mulliken AD, Boyce MC. Polycarbonate and a polycarbonate-POSS nanocomposite at high rates of deformation. *J Eng Mater Technol* (invited submission for special issue “Time Dependent Behavior of Polymers and PMCs”) 2006; 128(4):543–550.

Soong SY, Cohen RE, Boyce MC, Mulliken AD. Rate-dependent deformation behavior of POSS-filled and plasticized poly(vinyl chloride). *Macromolecules* 2006; 39(8):2900–2908.

Mulliken AD, Boyce MC. Mechanics of the rate-dependent elastic-plastic deformation of glassy polymers from low to high strain rates. *International Journal of Solids and Structures* 2006; 43(5):1331–1356.

## **Selected Conference Presentations**

Mulliken AD, Herman H, Bruemmer D. Autonomous Mine Detection System (AMDS) mission robotics. *SPIE Defense, Security, and Sensing 2009*, Orlando, FL, April 13–17, 2009.

Mulliken AD, Boyce MC. Mechanics of high-rate deformation of amorphous polymers. 13<sup>th</sup> International Conference on Deformation, Yield, and Fracture of Polymers, Rolduc Abbey, Kerkrade, Netherlands, April 10–13, 2006.

Mulliken AD, Yi J, Boyce MC. Energy storage and dissipation during adiabatic deformation of amorphous polymers. 2005 Society for Experimental Mechanics Annual Conference and Exposition on Experimental and Applied Mechanics, Portland, OR, June 7–9, 2005.

Mulliken AD, Boyce MC. Mechanics of nanostructured polymers and polymer nanocomposites at high strain rates. Materials Research Society Spring Meeting, San Francisco, CA, March 28–April 1, 2005.

### **Prior Experience**

Research Staff Member, Institute for Defense Analyses, 2006–2009

Research Assistant, MIT Department of Mechanical Engineering, 2002–2006

Intern, ESSI, Sandia National Laboratories/California, summer, 2003

### **Peer Reviewer**

ASME Journal of Engineering Materials and Technology