

Daniel C. Drucker Medal



Professor Alan Needleman

*Division of Engineering
Brown University*

*For seminal contributions in the area of nonlinear
mechanical response and failure of solids, structures, and materials.*

Professor Alan Needleman received his BS from the University of Pennsylvania in 1966, and his MS and PhD from Harvard University in 1967 and 1970 respectively. He was appointed Instructor in Applied Mathematics in 1970, Assistant Professor in 1972, both at MIT. He moved to Brown University in 1975 and has remained there since, now holding the Florence Pirce Grant University Professorship. He served as Dean of Engineering from 1988 to 1991. Needleman has also held visiting positions at the Technical University of Denmark, Cambridge University and MIT.

Professor Needleman was one of the first researchers to use the computer and rigorous formulations of finite strain plasticity to address highly nonlinear problems in materials mechanics such as void growth, necking and shear banding. He was the first to generate an accurate solution to progressive necking in a bar using finite element simulation. His work on void growth in metals now underpins all the constitutive models for damage in ductile solids involving void nucleation, growth and coalescence. Needleman's contributions in the

8

general area of damage mechanics, and in ductile fracture mechanics, are well-recognized. He also led the way in the development and application of computational models which embed a cohesive zone representation of interface separation within an elastic/plastic continuum for quantifying phenomena such as debonding and delamination at interfaces in multiphase materials. His recent foray in to discrete dislocation modeling for capturing plasticity at the small scale is also ground breaking. Professor Needleman has published over 300 articles in archival journals and conference proceedings. He has given numerous invited lectures all over the globe.

He served as Associate Editor for the Journal of Applied Mechanics from 1998 to 2004 and is on the Editorial Board of over 10 journals. He has served on numerous advisory committees and panels and organized symposia and sessions for IUTAM, MRS, and other organizations. He received the John Simon Guggenheim Foundation Fellowship in 1977; he is a fellow of the ASME, Institute of Physics, and the American Academy of Mechanics and an Honorary Member of the Groupe Français de Mécanique de Matériaux. He became a Foreign Member of the Danish Center for Applied Mathematics and Mechanics in 1986. He is recognized by the

Science Citation Index as a Highly Cited Author in Engineering and Materials Science. He was elected to the National Academy of Engineering in 2000.

The Medal was presented at a Symposium held in honor of Professors Needleman and Viggo Tvergaard entitled "Bridging scales in mechanics—Where are the bottom and the top?" at Brown University on August 17, 2006.

The Daniel C. Drucker Medal was established in 1997 and is conferred in recognition of distinguished contributions to the field of applied mechanics and mechanical engineering through research, teaching and service to the community over a substantial period of time.