

Challenges in Solid Mechanics

Ken P. Chong

Director, Mechanics and Materials, Directorate for Engineering
National Science Foundation, Arlington VA 22230

Abstract

The mechanics communities need to re-invent themselves as evident from the disappearing of most TAM departments in the country. Most discoveries are at the interfaces of different disciplines. The National Science Foundation (NSF) has supported basic research in engineering and the sciences in the United States for a half century and it is expected to continue this mandate through the next century. As a consequence the United States is likely to continue to dominate vital markets because diligent funding of basic research does confer a preferential economic advantage. Concurrently over this past half century, technologies have been the major drivers of the U. S. economy, and as well, NSF has been a major supporter of these technological developments. According to the former NSF Assistant Director for Engineering, Eugene Wong, there are three *transcendent* technologies:

- Microelectronics – Moore’s Law: doubling the capabilities every two years for the last 30 years; unlimited scalability; nanotechnology is essential to continue this efficient miniaturization process.
- Information Technology – NSF backbone project in the 1980s was instrumental in launching the Internet revolution; confluence of computing and communications.
- Biotechnology – molecular secrets of life with advanced computational tools as well as advances in biological engineering, biology, chemistry, physics including mechanics and materials.

By promoting research and development at critical points where these technological areas intersect, NSF hope to foster major developments in engineering and mechanics. The solid mechanics communities will be well served if some specific linkages or alignments are made toward these and other innovative technologies since most discoveries are at the interfaces of different disciplines. Some thoughtful examples for the mechanics communities are:

• Bio-mechanics/materials	• Simulations/modeling
• Thin-film mechanics/materials	• MEMS/NEMS
• Wave Propagation/sensors	• Smart materials/structures
• Nano-mechanics/materials	• Designer materials

Considerable NSF resources and funding will be available to support basic research related to these technologies. Most of the funding at NSF will continue to support unsolicited individual investigator proposals on innovative “blue sky” ideas but not on traditional incremental research.