

Thomas J.R. Hughes Young Investigator Award



Pradeep Sharma

*Bill D. Cook Chair Associate Professor of Mechanical Engineering
The University of Houston*

For outstanding contributions to understanding size-effects of coupled mechanical and physical phenomena in materials

Professor Pradeep Sharma received his bachelor's degree in mechanical engineering from Maharaja Sayaji University of Baroda, India in 1994. He then earned his Ph.D. in micromechanics of materials (mechanical engineering) from University of Maryland at College Park in the year 2000. He also has background in solid state and mathematical physics. Subsequent to his doctoral degree, he was employed at General Electric R & D for more than three years as a research scientist. He joined the department of mechanical engineering at University of Houston in January 2004 as an assistant professor and is currently the Bill D. Cook Associate Professor.

Professor Sharma is interested in theoretical and computational mechanics and physics of materials. Specifically his research has focused on coupled strain-quantum mechanical behavior in quantum dots and defects, nanoscale piezoelectricity and generalized electromechanical couplings, energy storage in nanocapacitors, size-effects in elasticity, among others.

Professor Sharma has performed systematic identification of the various physical causes for size-dependency in the elastic state at small scales. As example, based on such mechanisms, he published a detailed map that elucidates the "length scales at which classical continuum elasticity breaks down for various materials". A part of his work focused on the coupling between quantum mechanical properties of nanostructures and mechanical strain. In this research topic, he established scaling behavior for electronic-strain coupling and showed that not only strain impacts the electronic structure or quantum mechanical behavior of solids but also that quantum confinement may "produce" mechanical strain where none existed.

More recently Professor Sharma has been working on piezoelectricity at the atomic scale. He showed the tantalizing possibility of creating "apparently piezoelectric" composites without using piezoelectric constituents and the emergence of "giant" piezoelectricity" in certain types of nanostructures. This work on dielectrics is now also finding application in understanding the origin of the so-called "dead-layer" in nanocapacitors for energy storage.

His honors and awards include the Young Investigators Award from Office of Naval Research, and the Texas Space Grants Consortium New Investigators Program Award. He is an associate editor of the Journal of Applied Mechanics.

The Young Investigator Award was established in 1998 and renamed the Thomas J.R. Hughes Young Investigator Award in 2008. The Award recognizes special achievements in Applied Mechanics for researchers under the age of 40.