Thomas J.R. Hughes Young Investigator Award

Chad M. Landis
Associate Professor of Aerospace Engineering
and Engineering Mechanics
The University of Texas at Austin

For outstanding contributions to
the mechanics of active materials

Professor Chad Landis received his bachelor's degrees in mechanical engineering and business from the University of Pennsylvania in 1994. He then went on to earn his MS (1997) and PhD (1999) degrees in mechanical engineering from the University of California at Santa Barbara. After spending a year and a half at Harvard University as a post-doc, he then went to Rice University where he was a member of the Mechanical Engineering and Materials Science faculty from 2000-2006. He is now an Associate Professor of Aerospace Engineering and Engineering Mechanics at the University of Texas at Austin.

Professor Landis has made a number of outstanding contributions to the mechanics of active materials. His research focuses on continuum modeling and numerical simulation of the mechanical, electrical, magnetic and thermal behavior of materials. His specific interests are on materials such as ferroelectrics and ferromagnetic shape memory alloys. He also has a broad range of interests in the mechanics of materials, including fracture mechanics, plasticity, micromechanics, composites, and finite element methods.

He created phenomenological constitutive laws that are capable of predicting the nonlinear electromechanical response of ferroelectric materials, and is now extending these ideas to other ferroic systems. This constitutive law is now being actively used in finite element codes such as ABAQUS, and in design processes within companies that make ferroelectric actuators for such applications as fuel injectors.

He has also worked on electromechanically driven fracture of ferroelectrics. This subject is just as challenging as the constitutive law question, for similar reasons – complex interactions of electrical and mechanical effects and deeply nonlinear response. He brought together a proper thermodynamic framework of the problem with sound constitutive laws, and very effective modeling, to bring order to the subject. He is now sorting out the reasons why the electric field has the effect it does on the propagation of cracks, the role of domain switching in affecting the toughness, and the role of crack permeability and electrical discharge in fracture mechanics of electrically active materials.

Landis has received the Career Award from the National Science Foundation, and the Young Investigator Award from the Office of Naval Research.

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