

The Department of Mechanical Engineering
Stony Brook University

**TOPICS IN MECHANICAL ENGINEERING
THE FRANK W. OTTO DISTINGUISHED LECTURE SERIES**



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Lecture Title: Design of Emerging Engineered Materials System

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Abstract

Design of material systems with complex microstructures represents the future of materials development to achieve unprecedented product performance. While most of the existing methods are trial-and-error based, we are proposing systematic computational design methods that provide a seamless integration of design optimization, predictive materials modeling, processing/manufacturing, and data/informatics to enable the accelerated design and development of advanced materials systems. In this talk, we will first introduce a descriptor-based methodology for designing heterogeneous microstructural materials systems such as polymer nanocomposites and nanodielectric polymers. We will then introduce the use of topology optimization and quasi-random structures respectively for designing emerging metamaterial structures such as thin-film solar cells and high-performance transparent solar cell structure considering natural sunlight illumination. Challenges and opportunities in this new research field will be discussed.

Biography

Dr. Wei Chen is the Wilson-Cook Chair Professor in Engineering Design at Northwestern University. Directing the Integrated DEsign Automation Laboratory (IDEAL- <http://ideal.mech.northwestern.edu/>), her current research involves issues such as simulation-based design under uncertainty, model validation, stochastic multiscale analysis and design, robust shape and topology optimization, multidisciplinary optimization, consumer choice modeling and enterprise-driven decision-based design. She is the co-founder and Director of the interdisciplinary doctoral cluster in Predictive Science and Engineering Design (PSED) at Northwestern. She is also serving as the Chair of the research faculty council of the Segal Design Institution.

Dr. Chen received her Ph.D. from the Georgia Institute of Technology in 1995. She served on the ASME Design Engineering Division (DED) Executive Committee (2009-2015, Chair in 2014-2015) and was an elected Advisory Board member of the Design Society (2007-2013). She is a review editor of Structural and Multidisciplinary Optimization and served twice as an Associate Editor of the ASME Journal of Mechanical Design. In addition, she serves as the Associate Editor of SIAM/ASA Journal on Uncertainty Quantification (JUQ) and the Department Editor for the IIE Transactions. Dr. Chen was the recipient of the 1996 NSF Faculty Early Career Award, the 1998 American Society of Mechanical Engineers (ASME) Pi Tau Sigma Gold Medal achievement award, the 2006 SAE Ralph R. Teetor Educational award, and the 2015 ASME Design Automation Award, the highest achievement award in design automation. She is a Fellow of American Society of Mechanical Engineers (ASME) and an Associate Fellow of American Institute of Aeronautics and Astronautics (AIAA).



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