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First-principles based multiscale multiphysics approaches for integrated computational materials engineering

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Advanced materials play key roles in the technological developments in many disciplines such as aerospace engineering, bioengineering, mechanical engineering and more. In order to reduce the cycle from design to deployment of advanced materials, integrated computational materials engineering (ICME) seeks to build a new paradigm that links design and manufacturing via materials models at multiple length scales in a seamless and integrated computational environment. Advances in computational, experimental material sciences and engineering offers promises for the rapid exploitation and introduction of new materials concurrent to system designs and engineering through the innovative framework. In this seminar, the importance of the first-principles based multiscale/multiphysics framework to realize the ICME paradigm will be demonstrated. By providing a deeper understanding of the underlying physics of the materials and systems at various length scales, a physics-based, i.e. first principles-based, computational predictive model would allow us to interpret and control complex materials and system behaviors.

Biography

Yao Fu is an Assistant Professor in the Department of Aerospace Engineering and Engineering Mechanics at the University of Cincinnati. Prior to that, she conducted her Post-doctoral studies at the Oak Ridge National Laboratory and University of Colorado at Boulder. She received her PhD degree in Mechanical Engineering from University of Pittsburgh in 2013. Her research interests lie in the area of computationally guided innovative materials design and manufacturing as well as atomistic-continuum multiscale simulation to realize the integrated computational materials engineering paradigm. Her work has been published in more than 20 peer-reviewed journals and book chapters.

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