Predictive Digital Twins and the Data-driven Future of Computational Science

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MAE Graduate Seminar and COE Distinguished Lecture
Wednesday, April 28, 4-5pm MDT, via ZOOM, Meeting ID: 994 8089 2374

ABSTRACT

A digital twin is an evolving virtual model that mirrors an individual physical asset throughout its lifecycle. Key to the digital twin concept is the ability to sense, collect, analyze, and learn from the asset's data. This talk will discuss the ways in which digital twins have the potential to transform design, manufacture, and operation of engineering systems. To make digital twins a reality, many elements of the interdisciplinary field of computational science, including physics-based modeling and simulation, inverse problems, uncertainty quantification, and scientific machine learning, have an important role to play.

BIO

Willcox holds a Bachelor of Engineering Degree from the University of Auckland, New Zealand, and masters and PhD degrees from MIT. Prior to joining the Oden Institute in 2018, she spent 17 years as a professor at MIT, where she served as Professor of Aeronautics and Astronautics, the founding Co-Director of the MIT Center for Computational Engineering, and the Associate Head of the MIT Department of Aeronautics and Astronautics. Prior to becoming a professor at MIT, she worked at Boeing Phantom Works with the Blended-Wing-Body aircraft design group. Willcox is Fellow of the Society for Industrial and Applied Mathematics (SIAM), Fellow of the American Institute of Aeronautics and Astronautics (AIAA), and member of the American Society for Engineering Education (ASEE). She is currently a member of the AIAA Board of Trustees. She is a current member of the National Academies Board on Mathematical Sciences and Analytics, and has served on five National Academies studies and review panels. In 2017, she was awarded Member of the New Zealand Order of Merit (MNZM).