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Graduate Seminar Speaker

John Hedengren

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Dynamic Optimization Across Disciplines

Abstract:

Many physical systems can be described by sets of differential and algebraic equations with either continuous or discrete variables. Recent progress has been made to solve large-scale and complex systems of these equations not only for simulation but also for data reconciliation and predictive control applications. Some applications shared in this presentation include biological systems, unmanned aerial systems, chemical process control, solid oxide fuel cells, grid-scale energy storage, and oil & gas upstream monitoring systems. Although these are considered to be in separate fields of research, there is a common approach to system modeling. The models are adjusted in real-time with parameter estimation to investigate fundamental system dynamics by uncovering unmeasured disturbances or parameters. Once the system is modeled accurately, a dynamic optimization approach can be used to drive the system either along a desired trajectory or to best meet single or multiple objectives. Recent progress and remaining challenges with large-scale and complex systems are reviewed.

Biography:

John Hedengren is a chemical engineer by training with a B.S. and M.S. degree from Brigham Young University, and a Ph.D. from the University of Texas at Austin. Currently he is an assistant professor at Brigham Young University in the Chemical Engineering Department. Prior to BYU he worked as a consultant for Celanese, SABIC Ibn Zahr, ExxonMobil, TOTAL, and other companies on optimization solutions for chemical manufacture and then for 5 years with ExxonMobil Chemical supporting advanced control and optimization solutions. Dr. Hedengren's area of expertise is in process systems engineering with application areas in systems biology, the oil and gas industry, smart grid optimization, unmanned aerial systems, and nonlinear solver development.

2:00 pm Lecture Presentation