

ME 250 SEMINAR

Control of Wind Energy Systems

Wind energy technology is a major player in utility-scale renewable energy for the production of electricity around the globe. Many countries share the strategic goal of increasing the penetration of wind energy into the electric grids. In the U.S. alone the goal is to increase from 100 gigawatts [GW] of wind power installed capacity, supplying 6% of the electricity demand, to 400 GW of wind power contributing 35% electricity by 2050. Attaining this goal would require a continued decrease of the cost of wind power. Advanced control systems are key to reducing the cost of wind energy, by maximizing annual energy production or reducing the operation and maintenance expenditures. This talk will provide an overview of the work done at the University of Texas at Dallas in (nearly) model free control of wind turbines and wind plants. It will be shown how extremum seeking control (ESC) may be used to improve the power production of existing turbines in the field. It will also be shown, how the turbine's ESCs may be coordinated to maximize the total power production of aerodynamically coupled turbines operating in a wind plant. Opportunities for R&D in next generation wind energy systems will be discussed as well.

THURSDAY, NOVEMBER 12, 2020 | ZOOM | 11:00 AM - 11:50 AM



Mario A. Rotea

Mario A. Rotea is the holder of the Erik Jonsson Chair in Engineering and Computer Science at the University of Texas at Dallas, where he is also the department head of mechanical engineering. Rotea spent 17 years at Purdue University as a professor of aeronautics and astronautics, developing and teaching methods for the analysis and design of control systems. He also worked for the United Technologies Research Center as senior research engineer on advanced control systems for helicopters, gas turbines, and machine tools. Rotea was the head of the Mechanical and Industrial Engineering Department at the University of Massachusetts Amherst, where he expanded the department in the area of wind energy and applications of industrial engineering to the health care sector. His career includes terms as director of the Control Systems Program and division director of Engineering Education and Centers at the National Science Foundation. Rotea is cofounder of WindSTAR, an NSF Industry University Cooperative Research Center aimed at bringing together academia and industry to advance wind energy through industry-relevant research and education. Rotea joined UT Dallas in 2009 to serve as professor and inaugural head of the then newly-created mechanical engineering department. He is a Fellow of the IEEE for contributions to robust and optimal control of multivariable systems. Rotea graduated with a degree in electronic engineering from the University of Rosario. He received a master's degree in electrical engineering and his Ph.D. in control science and dynamical systems from the University of Minnesota.