MECHENGINEERING SEMINAR

Hybrid Forecasting Systems for Integration of Large-Scale Solar Power Plants

Dr. Carlos F. M. Coimbra

Professor and Chair,
Mechanical and Aerospace Engineering
University of California, San Diego

Friday, November 8, 2019
11:00 am, ECSS 2.412

Abstract

Increasing penetration of weather-dependent renewable power into the electric grid requires strategies for coping with generation variability. Of the existing solutions, renewable energy forecasting is the cheapest and most readily deployable for both distributed generation and utility-scale central station power plants. Our group at UC San Diego has developed a number of specific forecasting systems that combine physics-based energy meteorology models with image analysis from both ground and geo-stationary satellite sources, all interlaced by machine learning techniques. These hybrid methods allow us to predict not only the position and optical depth of clouds, but also their movement over solar fields, and consequently the potential for solar power generation at the ground level. In this talk I will discuss some of the previous success stories in the field of energy meteorology, but also the ongoing efforts to improve forecast fidelity with the next generation of solar forecasting engines.

Biography

Carlos F. M. Coimbra is Professor and Chairman of the department of Mechanical and Aerospace Engineering at UC San Diego, where he is also the Director of the Renewable Energy Solutions Lab and also a Co-Director of the UCSD Center of Excellence in Renewable Resource Integration. He is the Editor-in-Chief of the Journal of Renewable and Sustainable Energy, published by American Institute of Physics (AIP), and directs a research group at UC San Diego interested in multiple aspects of renewable and sustainable energy science and technology. Current research topics of interest to his students include cloud microphysics, atmospheric shortwave and longwave radiation, aerosols, solar power conversion technology and integration, cloud image analysis, spectral optical properties of gases, liquids and solids, field sensors, pattern recognition, optimization by machine learning methods, etc.