

Title: Polynomial Optimization Problems in Practice: Optimal Periodic Control and Unit Commitment in AC power grids

Speaker: Jonathan Epperlein (IBM)

Abstract: For certain dynamical optimization problems, e.g. in the process industry, it has been observed that cyclic operation can improve objective function values over operation at optimal steady states. Finding such optimal periodic trajectories is termed Optimal Periodic Control (OPC).

One approach to OPC utilizes Fourier series together with Parseval's Theorem to transform the dynamical optimization problem into the minimization of a polynomial in the Fourier coefficients of a certain signal in the system; the talk will describe this method and present simple practical examples. This was joint work with Bassam Bamieh (UCSB).

In the second part, an application of polynomial optimization to the problem of finding the optimal schedule of generating units to meet forecast and reserve requirements in an alternating-current generation and transmission network is presented, using the example of a grid on the Canary Islands. This work was performed by Claudio Gambella and Jakub Marecek (IBM Research Ireland) in collaboration with Red Eléctrica de España.