Abstract

Reducing greenhouse gas emissions is now an important and urgent matter. A key observation is that systems control theory, and in particular feedback control, can be helpful in designing policies that achieve sustainable levels of emissions of CO$_2$ (and other greenhouse gases) while minimising the impact on the economy, and at the same time explicitly addressing the high levels of uncertainty associated with predictions of future emissions.

In this talk, we give preliminary results for an approach where model predictive control is applied to a model of the UK economy (UK 4see model) to design sustainable policies for greenhouse gas emissions. Using feedback control, the policies are updated on the basis of the actual emissions, rather than on the predicted level of emissions. The basic structure and principle of the UK 4see model is described and its implementation in Simulink is presented. A linearised state space model is obtained and model predictive control is applied to design policies for CO$_2$ emissions. Simulation results are presented to demonstrate the effectiveness of the proposed method. The preliminary results obtained illustrate the strength of the proposed design approach and form the basis for future research on using systems control theory to design optimal sustainable policies.