

Optimal Periodic Control

Project #: RBV1

Optimal Control provides open loop control strategies, which minimise a performance index. In applications to resource economics, the boundary conditions on the state variable are often periodic. These boundary conditions correspond to a 'sustainable harvesting' constraint, requiring the population to be the same at the end and beginning of the cycle. In this project, analytical and computational techniques will be considered for solving optimal periodic control problems. Case studies will include a problem of periodic ship control. The project involves mathematical analysis and use of MATLAB packages for simulation and computation.

Bearings only Target Tracking

Project #: RBV2

Tracking concerns the estimation of the position of a maneuvering target from noisy sensor measurements. Tracking problems arise in air traffic control, missile defence, surveillance and other areas. In bearings only tracking, measurements are available only of 'angle to line of sight'. This project concerns the investigation of new algorithms for bearings only tracking. The project involves mathematical analysis (mostly probability) and use of MATLAB packages for simulation and computation.

A Model Predictive approach to Path Following

Project #: RBV3

This project concerns the design of feedback controllers to track a desired output trajectory. The focus will be on model predictive control techniques, in which deviation from the desired output is penalized in the cost function. Comparisons will be made with other approaches. The project involves mathematical analysis and use of MATLAB packages for simulation and computation.

Surge Tank Control

Project #: RBV4

Surge tanks are widely used devices in process control, which even out the flow rate of fluids passing between process units. The aim of this project is to try out some latest ideas for the design of a nonlinear controller, based on a 'worst case' analysis, to regulate the flow rate. It is expected that modern methods of controller design will substantially improve on the performance of the traditional PI controllers widely used in industry – the project will, hopefully, confirm this. Mathematical analysis and use of MATLAB packages for simulation and computation are involved.