



CSC Seminar

SPEAKER

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TITLE

Iterative methods for solving periodic boundary value problems for nonlinear ODEs with switchings

ABSTRACT

An isoperimetric optimal control problem with non-strictly convex cost is considered for nonlinear systems of ordinary differential equations subject to periodic boundary conditions and input constraints. This type of problems appears naturally, e.g., in the optimization of non-isothermal reaction models in chemical engineering. It is shown that the optimal controls are piecewise constant (bang-bang) in the considered case due to the Pontryagin maximum principle. We present an estimate of the number of switchings of the extremal controllers and formulate the general problem of computing periodic solutions with discontinuous controls. An approximation of the periodic solutions with bang-bang controls is presented, based on the Baker-Campbell-Hausdorff-Dynkin formula. In the case of systems with dominating linear parts, an iterative scheme for approximating the periodic solutions is presented for arbitrary values of periods. It is shown that this scheme can be improved with the use of Newton type methods.

Tuesday, December 6, 2022 at 2 pm
seminar room Prigogine