ALPEN-ADRIA UNIVERSITÄT KLAGENFURT

Invitation to a Guest Lecture

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"On a class of periodic optimal control problems with isoperimetric constraints"

Z.1.08 | Friday, 25 November 2022 | 11:30 a.m.

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 existence and computation of periodic solutions under the discontinuous control. For small periods, an approximation of the periodic solutions with discontinuous control functions is presented, based on the Chen-Fliess expansion. 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.

Christian Pötzsche and the Department of Mathematics look forward to seeing you at the talk!