

Sensitivity results for bang-bang control problems

URSULA FELGENHAUER

Institute of Appl. Math. and Comp. Sci.
Brandenburg University of Technology Cottbus, Germany
e-mail: felgenh@tu-cottbus.de

Abstract

Stability investigation of parametric problems with bang-bang type optimal controls, first, aims to find conditions on the problem data which ensure invariance of the principal control structure under perturbation, and secondly, is directed to sensitivity calculation and local solution prediction. In case of vector-valued controls, it is known that the switching points positions may be nondifferentiable functions of parameters if more than one control components switch simultaneously at a time. In this situation, under reasonable assumptions, their Lipschitz continuity w.r.t. parameter changes was recently shown.

The aim of the talk is to explain techniques of stability and sensitivity analysis for a class of bang-bang problems. Further, for problems with fixed initial and free terminal state, the existence of directional derivatives w.r.t. initial values is shown. The sensitivity differentials herein are determined as solutions of certain nonsmooth optimization problem.

Important impulses for the talk have been obtained from joint work on the topic with G. Stefani and L. Poggiolini (University of Florence, Italy).

As yet the analysis is restricted to at most double switches.

Key Words: Stability in control problems, bang-bang control, nonsmooth optimization, sensitivity differentials.