ALPEN-ADRIA UNIVERSITÄT KLAGENFURT

INVITATION TO THE DOCTORAL SEMINAR

Controllability and bifurcation for nonautonomous control systems

Roberta Fabbri | Universitá di Firenze, Italy

Chaired by Christian Pötzsche | Department of Mathematics

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HS 11

ABSTRACT

In the talk controllability properties of nonautonomous control-affine systems with compact control range of the form

$$\dot{x}(t) = f_0(\omega \cdot t, x(t)) + \sum_{i=1}^{m} u_i(t) f_i(\omega \cdot t, x(t)), \quad u(t) = (u_i(t))_{i=1,\dots,m} \in U, \tag{1}$$

are analyzed.

Here $f_i : \Omega \times M \to TM, i = 0, 1, \dots, m$, are continuous maps, Ω is a compact metric space, and M denotes a d-dimensional connected smooth (C^∞)-manifold with tangent bundle TM. For every $\omega \in \Omega$, any map $f_i(\omega, \cdot)$ is a C^1-vector field on M. The set $U \subset \mathbb{R}^m$ is compact and convex, and the control functions u are in

$$\mathcal{U} := \left\{ u \in L^\infty(\mathbb{R}, \mathbb{R}^m) \mid u(t) \in U \text{ for almost all } t \in \mathbb{R} \right\}.$$

Furthermore, (Ω, σ) is a minimal continuous flow with $\sigma : \mathbb{R} \times \Omega \to \Omega$ written as $\sigma(t, \omega) = \sigma_t(\omega) = \omega \cdot t, t \in \mathbb{R}$.

After introducing the associated control flow in the extended space $\mathcal{U} \times \Omega \times M$, the generalized controllability properties of the problem are considered. In

particular, the concepts of nonautonomous control sets and invariant control sets, and their relations with the nonautonomous equilibria for the uncontrolled system are studied, and some bifurcation results for the scalar case ($M = \mathbb{R}, d = 1$) are given. The presented results combine methods from nonautonomous dynamical and control systems.

This is a joint work with Fritz Colonius, Universität Augsburg.

We hope to see you there!

