

Fabio Ancona (ancona@ciram.unibo.it), Department of Mathematics and C.I.R.A.M., Università di Bologna, Piazza Porta S. Donato 5, Bologna 40127, Italy, *Stabilization by Patchy Feedbacks and Robustness Properties*

This talk is concerned with the problem of constructing discontinuous stabilizing feedbacks for nonlinear control system, which enjoy robustness properties with respect to external and internal perturbations. We first consider “patchy” vector fields, a class of discontinuous, piecewise smooth vector fields introduced in [1], and we prove the stability of the corresponding solution set with respect to impulsive perturbations. A linear estimate of the effect produced by such perturbations is also established for a generic class of patchy vector fields in the plane, that admit discontinuities across polygonal lines. Next, we apply these results to derive robustness properties with respect to both (internal) measurement errors and persistent external disturbances for “patchy feedbacks”: a class of feedback laws that generate patchy vector fields. This talk is based on joint work with Alberto Bressan.

- [1] Ancona, F., and A. Bressan, “Patchy vector fields and asymptotic stabilization,” *ESAIM: Control, Optimiz. Calc. Var.*, **4**(1999), pp. 445-471.
- [2] Ancona, F., and A. Bressan, “Flow Stability of Patchy Vector Fields and Robust Feedback Stabilization,” *SIAM J. Control Optim.*, **41**(2003), pp.1455-1476.
- [3] Clarke, F., Yu.S. Ledyev, L. Rifford, and R. Stern, “Feedback stabilization and Lyapunov functions,” *SIAM J. Control Optim.*, **39**(2000), pp. 25-48.
- [4] Sontag, E., “Stability and stabilization: discontinuities and the effect of disturbances,” in *Proc. NATO Advanced Study Institute - Nonlinear Analysis, Differential Equations, and Control*, (Montreal, Jul/Aug 1998), F.H. Clarke and R.J. Stern eds., Kluwer, 1999 , pp. 551-598.