

Looking for simultaneous local and global bifurcations in piecewise linear Filippov systems

ENRIQUE PONCE

(in collaboration with E. Freire (Universidad Sevilla), F. Torres (Universidad Sevilla), and A. M. Rivera (Universidad P. Javeriana Cali))

Departamento de Matemática Aplicada, Escuela Técnica Superior de Ingeniería, Universidad de Sevilla, Sevilla, Spain

We deal with the dynamical richness of planar discontinuous piecewise smooth systems, that is Filippov systems in the plane with two zones and a straight line as the discontinuity manifold.

In a recent work [2], it was reported the possibility of concurrent homoclinic bifurcation and Hopf bifurcation in a piecewise smooth system constituted by a linear plus a quadratic vector field, leading to the simultaneous generation of two limit cycles.

Here, we show that a richer dynamics can be obtained by considering just a discontinuous piecewise linear system, where in a half-plane the dynamics is of focus type while there is a saddle in the other. Namely, *a simultaneous generation of three limit cycles surrounding the sliding set is shown*: one of the limit cycles comes from a homoclinic connection and the other two arise from a local bifurcation related to a boundary focus, in a similar way as it was done in [1].

- [1] E. Freire, E. Ponce, and F. Torres, *A General Mechanism to Generate Three Limit Cycles in Planar Filippov Systems with Two Zones*, *Nonlinear Dyn.* **78** (2014), 251–263.
- [2] L. Li and L. Huang, *Concurrent homoclinic bifurcation and Hopf bifurcation for a class of planar Filippov systems*, *J. Math. Anal. and Appl.* **411** (2014), 83–94.