Piecewise linear systems and singular perturbation techniques

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In this work we describe some qualitative and geometric aspects of piecewise linear systems on $\mathbb{R}^2$ around typical singularities. By means of a regularization process proceeded by a blow–up technique [1] we are able to establish an interaction between three important themes of the qualitative theory of non-smooth dynamical systems:

- synchronization phenomena,

- sliding vector fields (also known as Filippov systems) and

- singular perturbation.

The regularization process developed by Llibre, da Silva and Teixeira [1] is crucial for the development of this work.

References

[1] Llibre, J., Silva, P.R. and Teixeira, M.A. (2007). Regularization of Discontinuous Vector Fields via Singular Perturbation, *J. Dynam. Differential Equation* **19**, 309–331.