On the limit of regularized piecewise-smooth dynamical systems

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This work deals with piecewise-smooth dynamical systems and with regularizations, where the jump discontinuities of the vector field are smoothed out in an ε-neighbourhood by using a continuous transition function. It addresses the following questions:

- does the solution of the regularization, for $\varepsilon \to 0$, converge to a Filippov solution of the discontinuous problem ?
- under which condition is the limit for $\varepsilon \to 0$ of the regularized solution independent of the transition function ?

Emphasis is put on the situation, where there is non-uniqueness of solutions for the discontinuous problem. The results are complemented by numerical simulations.

This work is a continuation of the results in the publications

N. Guglielmi and E. Hairer, *Classification of hidden dynamics in discontinuous dynamical systems.* SIAM J. Appl. Dyn. Syst. 14(3) (2015) 1454–1477.

N. Guglielmi and E. Hairer, *Solutions leaving a codimension-2 sliding.* Nonlinear Dynamics 88(2) (2017) 1427-1439

which can be downloaded from

`http://www.unige.ch/~hairer/preprints.html`