

A topological approach to computing the Conley index of Poincaré maps

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The homological Conley index of an isolated invariant set of the Poincaré map carries an essential information on the qualitative behavior of a flow, related, in particular, to the existence of periodic orbits and chaotic dynamics. In order to determine the index one usually tries to find an approximate value of the Poincaré map by a numerical integration. That approach frequently fails due to exponential growth of errors during computations. In the talk, based on a joint research with Marian Mrozek and Frank Weilandt, I present the theoretical background of a quite different method, based on a construction of an index pair and corresponding singular chains in the suspension of the Poincaré map. In our method, a relatively short time approximation of the flow is needed only; no integration in the whole time-range of the Poincaré map is required.

References

- [1] *M. Mrozek, R. Srzednicki*: An efficient topological algorithm for computing the Conley index of a Poincaré map of a time-periodic differential equation. Part I: Theoretical background (in preparation).
- [2] *M. Mrozek, R. Srzednicki, F. Weilandt*: An efficient topological algorithm for computing the Conley index of a Poincaré map of a time-periodic differential equation. Part II: An implementation (in preparation).