Robust Computation of Saddle Periodic Orbits
– scientific report –

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1. *Purpose of the visit*: the purpose of the visit was to find a common ground and determine a sensible road-map for the project.

2. *Description of the work carried out during the visit*: the mathematical problem was motivated, a model example was constructed, and the current algorithmic challenges were discussed.

3. *Description of the main results obtained*: the resulting road-map is as follows:

   (a) Develop algorithms and software to extract the saddle periodic orbit from the model example with mathematical guarantees.

   (b) Extend the algorithms with the capability to treat continuous piece-wise multilinear vector fields since they are ubiquitous in practice.

   (c) Develop efficient algorithms and software to find candidate regions in continuous piece-wise multilinear vector fields that might contain saddle periodic orbits. In contrast to the approach above, we do not require mathematical guarantees. Instead, we require the ability to deal efficiently with large data sets produced by e.g. computational fluid dynamics simulations.

   (d) Integrate both software packages and consider model examples from computational fluid dynamics as well as real-world data from numerical simulations.

4. *Future collaboration with host institution (if applicable)*: the host institute will focus on steps (a) and (b), while the applicant will focus on (c). Step (d) of the road-map will require close interaction of both institutions.

5. *Projected publications/articles resulting or to result from your grant*: a journal article describing the developed algorithms and results is going to be written.