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Algorithmic aspects of the computation of the homological Conley index over the phase space for semidynamical systems with discrete time

The purpose of this short visit was to conduct some preliminary research in the project aimed at the development of an algorithmic method for the computation of the homological Conley index over the phase space, described in details in the ESF Exchange Visit Grant Application Ref. 3808 for a visit of Dr. Jacek Szybowski (AGH University of Technology, Krakow, Poland) at the University of Minho, Braga, Portugal in August 2012.

During the visit, we were working on the development of a prototype computer program for the computation of the homological objects (spaces and homomorphisms) necessary for the computation of the homological Conley index over the phase space. We pushed this work forward to such a stage that we were able to process a few very simple examples in R^2 which show that this generalization of the classical Conley index can distinguish systems that the original one cannot. We also discussed the conditions for combinatorial index pairs in an isolating neighborhood built of full cubical sets in R^n satisfying the properties necessary from the point of view of the underlying theory. Unfortunately, the short time of this visit didn't allow us to develop an algorithm for constructing such index pairs, so this part of work has been postponed to our next meeting in Portugal in August 2012.

The results of this work will be included in a paper on algorithmic computation of the homological Conley index over the phase space for semidynamical systems with discrete time that will be submitted to an international peer-refereed academic journal upon completion of this project.