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Bifurcation detected by a Spectral Sequence in the Morse-Smale Setting

The purpose of this talk is present a procedure in the context of Morse-Conley Theory which allows us to obtain dynamical information from algebraic-topological tools.

Given a flow on a compact manifold M and a filtered chain complex whose differential is a connection matrix, we focus on the associated spectral sequence. In this context, we introduce a sweeping algorithm, which codifies in the connection matrix the information of the spectral sequence [1].

The sweeping algorithm produces a family of connection matrices and associated transition matrices which retrieve the information given by the spectral sequence and recover dynamical information of the initial flow. In [1] one shows the existence of paths in the flow associated to nonzero differentials of the spectral sequence.

In this talk we present another result which identifies further dynamical information codified by the sweeping algorithm. Given a Morse-Smale flow in M and its associated family of connection and transition matrices, we introduce in [2] directed graphs, called schematics, which depict the bifurcation that could occur if this sequence of matrices were realized in a flow continuation. In this way, a sequence of schematics can be seen as a continuation where the transition matrices give the information about the bifurcation behavior.

References

[1] O. Cornea, K.A. de Rezende, M.R. Silveira, *Spectral sequences in Conley's theory.* Ergodic Theory and Dynamical Systems **30**(4) (2010).

[2] R.D. Franzosa, K.A. de Rezende, M.R. Silveira, *Continuation and bifurcation associated to the dynamical spectral sequence.* Ergodic Theory Dynamical Systems, **34**(6) (2014).