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Conley index theory for sampled dynamical systems

In late 90' R. Forman [1, 2] introduced the concept of a combinatorial vector field on a CW complex and presented a version of Morse theory for acyclic combinatorial vector fields. Recently, an extension of this theory towards Conley index theory, has been presented in [3, 4]. In particular, the extension covers such concepts as attractors, repellers, Morse decompositions, Conley-Morse graphs. Moreover, the extension applies to a generalized concept of combinatorial multivector fields. Such fields are better adjusted to the needs of modelling differential equations.

In this talk we will present the foundations of the new theory, the bridges between the classical and combinatorial theory and potential applications to nonlinear differential equations and sampled dynamical systems. In particular, we will show how the combinatorial multivector fields may be used to model the dynamics of a differential equation and how similar methods may be applied to study sampled dynamical systems [5].

References

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