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Towards a formal tie between combinatorial and classical vector field dynamics

The Forman's discrete Morse theory is an analogy of the classical Morse theory with, so far, only informal ties. Our goal is to establish a formal tie on the level of induced dynamics. Following the Forman's 1998 paper on "Combinatorial vector fields and dynamical systems", we start with a possibly non-gradient combinatorial vector field. We construct a flow-like upper semi-continuous acyclic-valued mapping whose dynamics is equivalent to the dynamics of the Forman's combinatorial vector field, in the sense that isolated invariant sets and index pairs are in one-to-one correspondence.

This is a joint work with M. Mrozek and Th. Wanner.