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Weak Index Pairs and the Conley Index for Discrete Multivalued Dynamical Systems

Motivation to revisit the Conley index theory for discrete multivalued dynamical systems [T. Kaczynski and M. Mrozek, *Topology Appl.*, 65(1995), pp. 83–96] stems from the needs of broader real applications, in particular in the problem of reconstructing dynamics from samples or in combinatorial dynamics. We introduce a new, less restrictive definition of the isolating neighborhood. It turns out that then the main tool for the construction of the index, i.e., the index pair, is no longer useful. In order to overcome this obstacle we use the concept of weak index pairs.