

COMPUTING THE GLOBAL DYNAMICS OF PARAMETERIZED SYSTEMS OF ODES

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We present a combinatorial topological method to compute the dynamics of a parameterized family of ODEs. A discretization of the state space of the systems is used to construct a combinatorial representation from which recurrent versus non-recurrent dynamics is extracted. Algebraic topology is then used to validate and characterize the dynamics of the system. We will discuss the combinatorial description and the algebraic topological computations and will present applications to systems of ODEs arising from gene regulatory networks.