

1116-00-3003

**Konstantin Mischaikow\***, Rutgers University. *Rigorous Analysis of Dynamics of ODEs with Unknown Nonlinearities*

Models of multiscale systems, such as those encountered in systems biology, are often characterized by heuristic nonlinearities and poorly defined parameters. Furthermore, it is typically not possible to obtain precise experimental data for these systems. Nevertheless, verification of the models requires the ability to obtain meaningful dynamical structures that can be compared quantitatively with the experimental data. With this in mind we present an approach to characterizing dynamics that is based on a combinatorial/algebraic/topological techniques. Combinatorics is used to model and describe the dynamics. Partitioning of parameter space is done via semi-algebraic sets. Algebraic topology is used to provide rigorous guarantees of the dynamics. We will describe these ideas in the context of models for gene regulatory networks. (See <http://www.ams.org/meetings/short-courses/short-course-general#mis> for more details and list of references.) (Received December 31, 2015)