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Two theorems on singularly perturbed semigroups with applications to some genetic models

In our talk we present two theorems on convergence of semigroups related to singularly perturbed abstract Cauchy problems, and apply them to some examples of recent models in applied mathematics. The semigroups considered are related to piecewise deterministic Markov processes jumping between several copies of a rectangle in M -dimensional Euclidean space and moving along deterministic integral curves of some ODEs between jumps. Our theorems describe limit behavior of the processes in the cases of fast jumps and fast motions in the direction of chosen variables. These results are motivated by Kepler-Elston's model of gene regulation and Lipniacki's model of gene expression. We will also shortly discuss applications to other models, including those of mathematical economics.