

REGULAR AND CHAOTIC OSCILLATIONS IN SINGULARLY PERTURBED SYSTEMS WITH DELAY

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The article offers special research methods for investigating both local and nonlocal dynamics of wide range singularly perturbed systems with delay. When studying local behaviour of solutions it appeared to be characteristic a realization of critical cases of the problem regarding station stability of infinite dimensions. Available methods of invariant integral manifolds and methods of normal forms tend to be not applicable.

The author has developed a special method of quasinormal forms based on arranging special series of nonlinear evolutionary equations which do not contain small or big parameters, and nonlocal dynamics of which describes local behaviour of solutions for an original system with delay.

An efficient method implying reduction to finite-dimensional mapping is proposed to investigate nonlocal dynamics of singularly perturbed systems with delay. The dynamics of the latter describes the structure of original system attractors. The result is asymptotics of both regular and irregular relaxation oscillations. Applications have been considered. A number of conclusions have been made on dynamic features specific exclusively for systems with delay.