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Section:

9. Ordinary Differential Equations and Dynamical Systems

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Exchange of stabilities in singularly perturbed systems

Consider singularly perturbed systems of ordinary differential equations of the form $(*)$ $dx/dt = f(x, y, t, \varepsilon)$, $\varepsilon dy/dt = g(x, y, t, \varepsilon)$ where ε is a small parameter. Assume that the degenerate equation $g(x, y, t, 0) = 0$ has two intersecting solutions exchanging their stability. By means of the method of upper and lower solutions we study the asymptotic behavior (with respect to the small parameter ε) of the solution of the initial value problem to $(*)$ on a finite t-interval. We derive conditions for an immediate and delayed exchange of stabilities. As a consequence we describe a new class of canard solutions.