

*Singular Perturbations of Non-linear Systems of
Differential Equations and an Associated
Boundary Layer Equation**

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1. Introduction. We are concerned with showing the relationship of the solutions of a certain “full” system of differential equations (1.1), as $\epsilon \rightarrow 0+$, to a particular solution of a related “degenerate” system (1.2). The systems are

$$(1.1) \quad \begin{aligned} \frac{dx}{dt} &= f(x, y, t, \epsilon) \\ \epsilon^r \frac{dy}{dt} &= g(x, y, t, \epsilon) \end{aligned}$$

$$(1.2) \quad \begin{aligned} \frac{dx}{dt} &= f(x, y, t, 0) \\ 0 &= g(x, y, t, 0) \end{aligned}$$

where x and f are real vectors of dimension $n_0 \geq 1$, y and g are real vectors of dimension $n \geq 1$, $\epsilon > 0$, and $r > 0$ is a fixed constant.

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