Spectral Methods for Singularly Perturbed Two-point Boundary Value Problems

Manfred R. Trummer[a]
[a]Department of Mathematics, Simon Fraser University, Burnaby, BC V5A 1S6, Canada, trummer@sfu.ca

We will present methods and results for solving two-point boundary value problems, both for single equations and systems, linear and nonlinear. We are interested in problems whose solutions exhibit very thin boundary layers, and in computing those solutions with spectral accuracy. A focus of the presentation is the well-known fact that spectral differentiation matrices are notoriously ill-conditioned, and how this ill-conditioning affects the robustness of the numerical methods being investigated.