

# A finite differences MATLAB code for the numerical solution of singular perturbation problems

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## Abstract

Many phenomena in engineering and physics are described by second order ODE-BVPs which depend on very small parameters. We show the main features of a matlab code for solving second order singular perturbation problems. The code is based on high order finite differences, in particular on the generalized upwind method. Within its simplicity, the code uses order variation and continuation for solving any difficult nonlinear scalar problem. Several numerical tests on linear and nonlinear problems are considered. The best performances are reported on problems with perturbation parameters near the machine precision, where most of the codes for two-point BVPs fail.