

ICM-9011-05 On the Stability of Compact Discretizations of Singularly Perturbed Differential Equations, E.C. Gartland, Jr., Proceedings ISAM '91, Dresden, March, 1991.

ABSTRACT: We survey and contrast the stability theory for compact difference approximations of m -th order linear differential equations with general auxiliary/side conditions (initial, boundary, multi-point, etc.) with the *uniform* (with respect to ε) stability theory for similar discretizations of singularly-perturbed (non-turning-point) problems. While general results are possible in the latter case, it differs in several ways from the "classical" theory. For example, uniformly consistent schemes are not automatically uniformly stable, and uniformly convergent schemes need not approximate uniformly well the continuous problem with respect to its stability constants and Green's function.