AN APPLICATION OF THE BAUER-FIKE THEOREM TO NONLINEAR EIGENPROBLEMS

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Abstract

We consider the problem of characterizing the approximation accuracy of a set of eigenvalues of the *nonlinear eigenvalue problem*

$$(-sI + A_0 + A_1 h(s)) \, v = 0, \, v \neq 0,$$

for an analytic function h. The analysis is done by successively applying *the Bauer-Fike theorem*, generating a sequence of conditions which relates the approximation with the solution. The sequence can be treated as a *fixpoint iteration* which is necessary to converge for the theory to yield accuracy information. We apply the analysis to an approximation of a *time-delay system*, where we find necessary and sufficient conditions for the fixpoint iteration to converge and show that it converges to a value explicitly expressible with the *Lambert W function*.