1077-65-1347 **Daniel B. Szyld** (szyld@temple.edu), 1805 N. Broad Street, Department of Mathematics, Temple University, Philadelphia, PA 19122, and **Fei Xue*** (fxue@temple.edu), 1805 N. Broad Street, Department of Mathematics, Temple University, Philadelphia, PA 19122. *Local convergence analysis of several inexact Newton-type algorithms for general nonlinear eigenvalue problems.* Preliminary report.

We study the local convergence of several inexact numerical algorithms closely related to Newton's method for the solution of a simple eigenpair of the general nonlinear eigenvalue problem $T(\lambda)v = 0$. We analyze the impact of the tolerances chosen for the approximate solution of the linear systems arising in these algorithms on the order of the local convergence rates. We show that the inexact algorithms can achieve the same order of convergence as the exact methods if appropriate decreasing sequences of tolerances are applied to the inner solves. When the local symmetry of $T(\lambda)$ is present, the use of a nonlinear Rayleigh functional is shown to be fundamental in achieving higher order of convergence rates. (Received September 19, 2011)