1096-VL-387 **Brandon J Hutchison*** (`brandon.hutchison@uafs.edu`), 5210 Grand Avenue, P.O. Box 3649, Ft. Smith, AR 72913, and **Mark Arnold**. *A Restarted Homotopy Method for the Nonsymmetric Eigenvalue Problem.*

The eigenvalues and eigenvectors of a Hessenberg matrix H are computed with a combination of homotopy increments and the Arnoldi method. Given a set, Ω, of approximate eigenvalues of H, there exists a unique vector $f = f(H, \Omega) \in \mathbb{R}^n$ where $\lambda(H - e_1 f^t) = \Omega$. A diagonalization of the homotopy $H(t) = H - (1 - t)e_1 f^t$ at $t = 0$ provides a prediction of the eigenvalues of $H(t)$ at later times. These predictions define a new Ω that defines a *new homotopy*. The correction for each eigenvalue has an $O(t^2)$ error estimate, enabling variable step size and efficient convergence tests. Computations are done primarily in real arithmetic, and bifurcations are avoided by restarting the homotopy with Arnoldi eigenvalues. Although the method is neither as elegant nor as robust as the QR algorithm, it is competitive in terms of flops in the randomly generated examples considered and is parallelizable. (Received September 01, 2013)

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