



A NEW KIND OF COMPANION MATRIX*

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Abstract. A new kind of companion matrix is introduced, for polynomials of the form $c(\lambda) = \lambda a(\lambda)b(\lambda) + c_0$, where upper Hessenberg companions are known for the polynomials $a(\lambda)$ and $b(\lambda)$. This construction can generate companion matrices with smaller entries than the Fiedler or Frobenius forms. This generalizes Piers Lawrence's Mandelbrot companion matrix. The construction was motivated by use of Narayana-Mandelbrot polynomials, which are also new to this paper.

Key words. Companion matrix, Eigenvalue, Narayana's cows sequence, Mandelbrot polynomials, Mandelbrot matrices.

AMS subject classifications. 15A18, 15A23, 65F15, 65F50.

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