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*Index of Nilpotent Matrices and the Nilpotent-Jacobian Method*

A nonzero pattern is a matrix with entries in  $\{0, *\}$ . A pattern is potentially nilpotent if there is some nilpotent real matrix with nonzero entries in precisely the entries indicated by the pattern. We construct some potentially nilpotent balanced tree patterns, and explore their index. Using the Nilpotent-Jacobian method, we observe that some balanced tree patterns are spectrally arbitrary. Inspired by an argument of Pereira, we uncover a feature of the Nilpotent-Jacobian method. In particular, we show that if  $N$  is the nilpotent matrix employed by this method to show that a pattern is a spectrally arbitrary pattern, then  $N$  must have full index. [Joint work with Hannah Bergsma and Adam van Tuyl]