1106-VO-114 **Brydon Eastman**, **In-Jae Kim**, **Bryan Shader** and **Kevin N. Vander Meulen***,
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Companion Matrix Developments.

The most familiar companion matrix is sometimes called the Frobenius companion matrix. In general, we define a companion matrix A to be an order n matrix with $n^2 - n$ fixed entries and n variable entries, $-a_1, -a_2, \ldots, -a_n$, such that the characteristics polynomial of A is $x^n + a_1x^{n-1} + \cdots + a_{n-1}x + a_n$. In 2003, Fiedler introduced a new class of companion matrices which includes the Frobenius companion matrix as a special case. Each Fiedler companion matrix has $n - 1$ nonzero fixed entries and n variable entries; we say that such a companion matrix is sparse. We show that not all companion matrices are sparse and provide both a matrix and digraph characterization of all the sparse companion matrices. We note that each sparse companion matrix, including each Fiedler companion matrix, is permutationally equivalent to a unit Hessenberg matrix. (Received July 18, 2014)