1163-15-35   **Udita N. Katugampola*** (`dkatugampola@floridapoly.edu`), Department of Applied Mathematics, Florida Polytechnic University, Lakeland, FL 33805. *Finding Eigenvectors: Fast and Nontraditional Approach.*

According to the classical *Gauss-Jordan* elimination approach, we would need five additional steps to find eigenvectors after finding the corresponding eigenvalues. However, we show that we only need one additional step for matrices with a spectrum, $|\sigma(A)| \leq 2$ since those vectors already appear as nonzero columns of the *eigenmatrices*, a term defined in this work. We further generalize this for matrices with $|\sigma(A)| > 2$ and show that eigenvectors lie in the column spaces of eigenmatrices of the complementary eigenvalues.

We introduce two major results, namely, the *2-Spectrum Lemma* and the *Eigenmatrix Theorem.* As a conjecture, we further generalize the Jordan canonical forms for a new class of generalized eigenvectors that are produced by repeated multiples of certain eigenmatrices. We also provide several shortcut formulas to find eigenvectors that does not use echelon forms. The method discussed in this work may be summarized with the mnemonic "Find your puppy at your neighbors'!" argument, where puppy is the eigenvector and the neighbors are the complementary eigenmatrices. (Received July 17, 2020)