

962-43-469

Gilbert Strang* (gs@math.mit.edu), M.I.T. Dept. Mathematics, Building 2 Room 2-240, 77 Massachusetts Avenue, Cambridge, MA 02139-4307, **Xiangwei Liu**, M.I.T. Dept. Mathematics, Building 2 Room 2-240, 77 Massachusetts Avenue, Cambridge, MA 02139-4307, and **Susan Ott**, M.I.T. Dept. Mathematics, Building 2 Room 2-240, 77 Massachusetts Avenue, Cambridge 02139-4307. *Localized eigenvectors from widely spaced matrix modifications*. Preliminary report.

We study the eigenvalues and eigenvectors of familiar structured matrices, after changes in a small number of entries. The number of changes is small relative to the size of the matrix, because the modifications are required to be "widely spaced". They produce new eigenvectors that are localized in and near the components that correspond to changed rows. By knowing the approximate form of the eigenvectors, we also determine a very close (and simple) approximation to the eigenvalues. Example: Start with 1's on the subdiagonal and superdiagonal. Add a single 1 on the diagonal. or a symmetric pair of 1's far from the diagonal. Then the top eigenvalue is very near $\sqrt{5}$. (Received September 15, 2000)