1023-L5-1735   **Umesh P Nagarkatte*** (`unagarkatte@hotmail.com`), 1650 Bedford Avenue, Office: C 400E, Brooklyn, NY 11225, and **Wilbert W Hope**. *Use of Singular Value Decomposition Theorem and Principal Component Analysis in Environmental Research — Research with Undergraduate Students.* Preliminary report.

Ambient air data on the criteria and toxic air pollutants for the Eastern Seaboard States from the Environmental Protection Agency (EPA)'s website was downloaded and studied for any emerging patterns by students who are mathematics and/or environmental science majors.

Principal Component Analysis (PCA) using MATLAB and PLS Toolbox was performed on the two types of EPA data separately and on the combined set (criteria and toxic). The goal was to extract more information on the comparative analysis of the quality of ambient air above the various states. The PCA revealed relatively high concentrations of PM10, PM2.5 and Lead in Pennsylvania and New Jersey while Connecticut, Georgia and New York exhumed high concentration of dichlorobenzene, ethyl benzene and toluene.

First, we will use a simple matrix of actual data to discuss the four fundamental subspaces and their significance in the Singular Value Decomposition (SVD) Theorem. The application of SVD is then described for large data sets, giving practical interpretation of terms such as eigenvalue, eigenvector, least squares, principal components and the left and right singular vectors. Various detailed calculations will be shown. (Received September 26, 2006)