1024-65-69 **Robert J Plemmons*** (plemmons@wfu.edu), Depts. Mathematics and Computer Science, Box 7388, Wake Forest University, Winston-Salem, NC 27109, and **Peter Zhang**, **Han Wang** and **Paul Pauca**. *Tensor Analysis of Spectral Images.*

In Nonnegative Matrix Factorization (NMF) an $m \times n$ (nonnegative) mixed data matrix X is approximately factored into a product of two nonnegative rank-k matrices, with k small compared to m and n, $X \approx WH$. This factorization has the advantage that W and H can provide a physically realizable representation of the mixed data. NMF is widely used in a variety of applications, including air emission control, image and spectral data processing, text mining, chemometric analysis, neural learning processes, sound recognition, remote sensing, and object characterization. Nonnegative Tensor Factorization (NTF) is a natural extension of NMF to higher dimensional data. In NTF, high-dimensional data, such as hyperspectral or other image cubes, is factored directly, it is approximated by a sum of rank 1 nonnegative tensors. The ubiquitous tensor approach, originally suggested by Einstein to explain laws of physics without depending on inertial frames of reference, is now becoming the focus of extensive research. Here, we develop and apply nonnegative tensor factorization (NTF) algorithms for analysis of spectral and hyperspectral image data. The algorithms combine features from both NMF and NTF methods. Test results provided. (Received December 27, 2006)