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**Palle E. T. Jorgensen, Sooran Kang and Myung-Sin Song\*** (msong@siue.edu), Department of Mathematics & Statistics, Southern Illinois University Edwardsville, Box 1653, Edwardsville, IL 62026, and **Feng Tian**. *Dimension Reduction and Kernel Principal Component Analysis*.

First, the background of the classical linear framework of Principal Component Analysis will be introduced. Then non-linear data-dimension reduction will be discussed. In nonlinear case, kernel-Principal Component Analysis is used instead with manifold and feature space transforms. The results extend earlier work for probabilistic Karhunen-Loève transforms on compression of wavelet images which were algorithms for optimization, selection of efficient bases, or components, which serve to minimize entropy and error; and hence to improve digital representation of images, and hence of optimal storage, and transmission. Several new theorems for data-dimension reduction will be presented, and with the use of frames in Hilbert space, and a new Hilbert-Schmidt analysis, we identify when a choice of Gaussian kernel is optimal. (Received September 06, 2019)