1106-60-2726 **Pemantha Lakraj Gamage*** (pemantha.lakraj@ttu.edu), Texas Tech University, Department of Mathematics and Statistics, Broadway and Boston, Lubbock, TX 79409, and **Frits Ruymgaart** (h.ruymgaart@ttu.edu), Texas Tech University, Department of Mathematics and Statistics, Broadway and Boston, Lubbock, TX 79409. *Some Asymptotic Properties of Silverman's Smoothed Functional Principal Components.*

Functional principal components (FPC) reduce dimensionality of infinite dimensional functional data. In many applications, smoothing is necessary when estimating functional principal components. Asymptotic properties of smoothed FPC have many theoretical and practical advantages.

Silverman's (1996) first smoothed FPC is the maximizer over the unit sphere of a quadratic form based on a modified (smoothed) version of the population covariance operator. The sample analogue of the smoothed population covariance operator is close (in probability) to the smoothed population covariance operator, which is in turn close to the original population covariance operator for small values of the smoothing parameter. Perturbation theory can be applied to study asymptotic properties of Silverman's (1996) smoothed FPC.

We define FPC in abstract Hilbert space with properties similar to Silverman's (1996) smoothed FPC. Consistency and asymptotic distributions are derived under mild conditions. We present the result as a simple corollary to general results on the perturbation of eigenvalues and eigenvectors. The rate for this consistency will be obtained. We restrict our attention to the first FPC. However, the same method can be applied to the higher order principal components. (Received September 16, 2014)