1003-26-756   **Paul Fishback*** (`fishbacp@gvsu.edu`), Department of Mathematics, Grand Valley State University, Allendale, MI 49401, and **Nathanial Burch**, Department of Mathematics, Grand Valley State University, Allendale, MI 49401. *The Least-Squares Property of the Lanczos' Generalized Derivative.* Preliminary report.

Developed in the 1950's, the Lancos' Generalized Derivative (LGD) is an integral-based, proper extension of the normal derivative. Lanczos' original construction of this derivative utilized a process of discretization and linear regression. Building upon this statistical origin of the LGD, we construct a new quantity, "instantaneous correlation," which is analogous to the usual discrete linear correlation coefficient. We show that the situation of a nonzero, normal derivative corresponds to perfect negative or perfect positive instantaneous correlation.

We also demonstrate how the LGD is a symmetric form of the so-called "Least-Squares Derivative" developed by Kopel and Schramm in 1990. This fact yields an orthogonal polynomial interpretation of the LGD, a result that allows us to construct higher-order Lanczos' Generalized Derivatives as convolutions involving Legendre Polynomials. (Received September 29, 2004)