

1046-46-1899

M ZUHAIR NASHED* (znashed@mail.ucf.edu), Department of Mathematics, University of Central Florida, Orlando, FL 32816. *A Hierarchy of Differential Approximations for Nonsmooth Operators and Variational Problems*. Preliminary report.

Let X and Y be real normed spaces and F be a mapping from X into Y . We introduce a class of approximations to $F(x+h)-F(x)$ in the form of a family $L(x+h)h$, where the family of bounded linear operators $L(x+h)$ is uniformly bounded in the operator norm for h sufficiently small and the remainder $R(x;h):= F(x+h)-F(x)- L(x+h)h$ is considered "infinitesimal" or of order $o(h)$ in a hierarchy of senses. The hierarchy includes (and is motivated by) the concept of slant differentiability introduced in the paper X.Chen,Z.Nashed, and L. Qi, Smoothing methods and semismooth methods for nondifferentiable operator equations, SIAM j. Numer. Anal. 38(2000), 1200-1216. Weaker and stronger notions of slant differentiability emerge in this setting that are useful for Newton-like methods for nonsmooth or ill-posed operator equations and nonsmooth mechanics. (Received September 16, 2008)