Veselý, L.; **Zajíček, L.**

Delta-convex mappings between Banach spaces and applications. (English) Zbl 0685.46027

Diss. Math. 289, 48 p. (1989).

The concept of delta-convex functions (i.e. differences of two continuous convex functions) is generalized to mappings F: $X \to Y$ between normed spaces. Such a mapping is called delta-convex if there exists a (continuous) convex function f: $X \to \mathbb{R}$ such that $f + y^* \circ F$ is a continuous convex function for all $y^* \in Y^*$ with $\|y^*\| = 1$. It is shown that differentiability of f implies that of F. Thus for Asplund spaces one obtains generic differentiability for locally delta-convex mappings. A composition theorem for locally delta- convex mappings is reproved. And an inverse function theorem (assuming that F^{-1} is Lipschitz) is given. Furthermore it is shown that some mappings which naturally arise in the theory of integral and differential equations (e.g. the Nemyckii and Hammerstein operators) are often delta- convex. The paper ends with 10 open problems.

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MSC:

46G05 Derivatives of functions in infinite-dimensional spaces

Keywords:

delta-convex functions; Asplund spaces; differentiability for locally delta-convex mappings; composition theorem; inverse function theorem; Nemyckii and Hammerstein operators