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Some new classes of nonconvex functions. (English) Zbl 1107.26014

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The author introduces some generalized convexity concepts for sets and functions. A set K is said to be φ-convex if

$$\exists \varphi, u + te^{i\varphi}(v-u) \in K, \quad \forall u, v \in K, t \in [0,1];$$

and a function f is said to be φ-convex if

$$\exists \varphi, f(u + e^{i\varphi}(v-u)) \leq tf(u) + (1-t)\varphi(v), \quad \forall u, v \in K, t \in [0,1].$$

For the corresponding optimization problem, each local minimum is global. Some properties of the related extension of the directional derivative are given. In particular, it provides an extension of the necessary and sufficient condition of optimality from the usual convex case.

Reviewer: Igor V. Konnov (Kazan)

MSC:

26B25 Convexity of real functions of several variables, generalizations
26D07 Inequalities involving other types of functions
39B62 Functional inequalities, including subadditivity, convexity, etc.
49J40 Variational inequalities

Keywords:

generalized convexity; φ-convex sets; φ-convex functions; optimality conditions