

1026-90-170

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A set is evenly convex if it is the intersection of some family (possibly empty) of open halfspaces. This class of convex sets was introduced by Fenchel in 1952 in order to extend the polarity theory to nonclosed convex sets. We show that this large class of convex sets captures the most outstanding properties of the subclass of closed convex sets.

Properties of convex sets are often used to study convex and quasiconvex functions because these classes of functions are characterized by the convexity of their epigraphs and sublevel sets, respectively.

In the same way, in 1980, Martínez-Legaz and Passy and Prisman, independently, started to use evenly convex sets in quasiconvex programming defining the evenly quasiconvex functions as those having evenly convex sublevel sets. We consider functions with evenly convex epigraphs, the so-called evenly convex functions, and study the main properties of this class of convex functions that contains the important subclass of lower semicontinuous convex functions. In particular, we try separate these two classes of functions and study if the class of evenly convex functions is closed under the main operations. (Received February 26, 2007)