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On Set-Valued Derivations Modulo K

Let Y be a real vector metric space and $K \subset Y$ be a closed convex cone with $K \cap (-K) = \{0\}$. We study properties of set-valued maps $F \colon \mathbb{R} \to 2^Y \setminus \{\emptyset\}$ which are additive modulo K, i.e. F(x+y)+K = F(x)+F(y)+K for $x, y \in \mathbb{R}$, and satisfy condition F(xy) + K = xF(y) + yF(x) + K for $x, y \in [0, \infty)$ (or $x, y \in \mathbb{R}$). Such maps are called set-valued derivations modulo K and generalize the well-known single-valued derivations of \mathbb{R} .

Keywords: K-additive set-valued map, (strong) set-valued K-derivation, K-lower boundedness, weak K-upper boundedness, K-continuity, null-finite set.

MSC: 39B62; 54C60, 26B25.