Section 13: Real Analysis | Poster number 192

On Darboux property for vector-valued functions

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ABSTRACT

In the talk we extend a result of [1].

Definition. Suppose that X is a Banach space. A set $V \subset X$ will be called *b-weakly connected* if it cannot be represented as the union $V = \bigcup\limits_{t\in T} V_t$ of a family of sets V_t so that $V_t \neq V$ and $V_t \cap cl\left(\bigcup\limits_{s\in T,\, s\neq t} co\, V_s\right) = \emptyset$ for each $t \in T$.

Here $cl\, E$ is the closure of a set E and $co\, E$ is the convex hull of E.

We denote by X^* the dual space of X.

Theorem. Suppose that X is a reflexive Banach space and $f : \Delta \to \mathbb{R}^m$ is a Frechet differentiable mapping of a domain (i.e. open connected set) $\Delta \subset X$ into $\mathbb{R}^m$, $m \geq 1$. Then the image $f'(\Delta)$ of the derivative of f is a b-weakly connected set in ${X^*}^m$.

Reference

1. Korobkov M. V. On One Generalization of the Darboux Theorem to the Multidimensional Case, Sib. Math. J. Vol. 41, No. 1, 2000, 100–112.

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