V. V. BILET, O. A. DOVGOSHEY [1]

Local Strong Porosity and its Application to the Theory of Pretangent Spaces

[1] *Institute of Mathematics, Kyiv, Ukraine*
E-mail: viktoriiabilet@gmail.com
E-mail: aleksdov@gmail.com

A pretangent space to the metric space X at a point p is a set of equivalence classes of sequences, tending to a sequence $(p, p, ...p, ...)$ with a given rate [1].

Let $E \subseteq [0, \infty)$. Write $\tilde{E}_0^d$ for the set of sequences $\tilde{\tau} = \{\tau_n\}_{n \in \mathbb{N}}$ such that $\tau_{n+1} \le \tau_n$, $\lim\limits_{n\to\infty} \tau_n = 0$ and $\tau_n \in E \setminus \{0\}$ for every $n \in \mathbb{N}$.

Definition. Let $E \subseteq [0, \infty)$ and $\tilde{\tau} \in \tilde{E}_0^d$. The set E is $\tilde{\tau}$-strongly porous at 0 if there are a constant $c \ge 1$ and a sequence of intervals $(a_n, b_n) \subset [0, \infty) \setminus E$ such that $\lim\limits_{n\to\infty} \frac{a_n}{b_n} = 0$ and $\frac{1}{c} a_n \le \tau_n \le c a_n$ for every $n \in \mathbb{N}$. If for every sequence $\tilde{\tau} \in \tilde{E}_0^d$ there is a subsequence $\tilde{\tau}' = \{\tau_{n_k}\}_{k \in \mathbb{N}}$ for which the set E is $\tilde{\tau}'$-strongly porous at 0, then the set E is w-strongly porous at 0.

Theorem 1 [2] *Let (X, d, p) be a pointed metric space. All pretangent spaces to X at p are bounded if and only if the set $\{d(x, p) : x \in X\}$ is w-strongly porous at 0.*

[1] O. Dovgoshey, O. Martio, Tangent spaces to general metric spaces, *Rev. Roumaine Math. Pures. Appl.*, **56**, No. 2 (2011), p. 137–155.

[2] V. Bilet, O. Dovgoshey, Boundedness of pretangent spaces to general metric spaces, *Ann. Acad. Sci. Fenn. Math.*, **39**, No. 1 (2014), p. 73–82.