

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

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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 $\tau_{n+1} \leq \tau_n$, $\lim_{n \rightarrow \infty} \tau_n = 0$ 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 $c \geq 1$ and a sequence of intervals $(a_n, b_n) \subset [0, \infty) \setminus E$ such that $\lim_{n \rightarrow \infty} \frac{a_n}{b_n} = 0$ and $\frac{1}{c}a_n \leq \tau_n \leq ca_n$ 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. [1] *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.*

The notion of pretangent spaces to a general metric space with a marked point was proposed, for the first time, in [2].

- [1] V. Bilet, O. Dovgoshey, Boundedness of pretangent spaces to general metric spaces, *Ann. Acad. Sci. Fenn. Math.*, **39**, No. 1 (2014), p. 73–82.
- [2] O. Dovgoshey, O. Martio, Tangent spaces to metric spaces, *Reports in Math., Helsinki Univ.*, **480** (2008), 20 p.