

# ABOUT THE FAITHFULNESS OF CANTOR SERIES EXPANSION CYLINDERS FAMILY FOR THE PACKING DIMENSION CALCULATION

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The report is devoted to finding conditions for the fine packing systems faithfulness with respect to packing dimension calculation. The packing dimension  $\dim_P$  [2] is fractal dimension in some sense dual to the Hausdorff dimension  $\dim_H$ .

Let us fix some family  $\Phi$  of balls from a metric space  $M$ .

**Definition 1.** A ball family  $\Phi$  is called faithful with respect to packing dimension calculation if  $\dim_P(E) = \dim_P(E, \Phi), \forall E \subset M$ .

## Examples of packing faithful families:

1. The family of  $s$ -adic cylinders;
2. The family of  $Q$ -cylinders;
3. The family of  $\tilde{Q}$ -cylinders if  $\inf_{i,j} q_{ij} > 0$ .

**Theorem 2.** *Let  $\Phi$  be the family of all possible closed intervals (cylinders), generated by the Cantor series expansion of real numbers.*

*Then the family  $\Phi$  is faithful for the Packing dimension if and only if*

$$\lim_{k \rightarrow \infty} \frac{\ln n_k}{\ln n_1 \cdot n_2 \cdot \dots \cdot n_{k-1}} = 0.$$

## References

- [1] S. Alberverio, V. Koshmanenko, M. Pratsiovytyi and G. Torbin, *On fine structure of singularly continuous probability measures and random variables with independent  $\tilde{Q}$ -symbols*, *Methods of Functional Analysis and Topology*, **2**(2011), P. 97–111
- [2] C. Tricot, Jr., *Two definitions of fractional dimension*, *Math. Proc. Cambridge Philos. Soc.*, **91**(1982), P. 57–74