Volchkov, V. V.

On functions with zero integrals over parallelepipeds. (English. Russian original) Zbl 1064.26500

Dokl. Math. 60, No. 3, 375-376 (1999); translation from Dokl. Akad. Nauk, Ross. Akad. Nauk 369, No. 4, 444-445 (1999).

A compact set $A \subset R^n$ is called a Pompeiu set if each locally summable function $f\ R^n \to C$ for which $\int_{\lambda A} f(x)dx = 0$ for all $\lambda \in \mathrm{ISO}(n)$ vanishes almost everywhere. ($\mathrm{ISO}(n)$ is the group of motions of R^n.)

Let $P(B_r)$ be the class of Pompeiu sets A for which $\lambda A \subset B_r$, where B_r is the sphere of radius r. The problem is to find $r(A) = \inf\{r > 0; A \in P(B_r)\}$. In this paper the author finds the exact value in the case

$$A = [-a_1, a_1] \times \cdots \times [-a_n, a_n].$$

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MSC:

26B15 Integration of real functions of several variables: length, area, volume
28A99 Classical measure theory
43A99 Abstract harmonic analysis

Keywords:

Pompeiu sets; vanishing integral