Zbl 106.27701
Erdős, Pál
About an estimation problem of Zahorski (In English)
Colloq. Math. 7, 167-170 (1960). [0010-1354]

The author refutes *Z.Zahorski*'s conjecture [Problem 168, Colloquium Math. 4, 241 (1957)] concerning the estimate of the following integral:

$$\int_0^{2\pi} |\cos n_1 x + \cos n_2 x + \cdots + \cos n_k x| dx = O(\log n_k).$$

He proves that

I: There exists a sequence n_k for which $\int_0^{2\pi} \left|\sum_1^k \cos n_i x\right| dx > Ck^{\frac{1}{2}-\varepsilon}$.

II: There exists a sequence n, for which $\int_0^{2\pi} \left|\sum_1^k \cos n_i x\right| dx = \sqrt{\pi}\sqrt{n_k} + o(\sqrt{n_k})$, which proves that $O(\sqrt{n_k})$ is the best estimate.

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Classification:
26A06 One-variable calculus
41A17 Inequalities in approximation