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Correction to "La multiplication de Rajchman et les ensembles $U(\varepsilon)$ de Zygmund"

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by

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The article claims that it provides a proof of the existence of Zygmund $U(\varepsilon)$ sets of full Lebesgue measure, shorter than the 1973 construction of Kahane and Katznelson. This is not true. The statement of Theorem 2 may be correct (it is an interesting question) but the proof is wrong. The proof works under the additional assumption that S is a bounded function. Therefore Theorem 2 should be replaced by the following lemma:

Lemma. *If S is a bounded function whose Fourier coefficients are $O(\varepsilon_n)$ and whose Fourier series converges to* 0 *on E, then S is the null series.*

The final statement uses this lemma and involves a sequence of closed $U(\varepsilon)$ sets of positive measure, their union, and B, the complementary set of this union (one can choose B with null Lebesgue measure).

Theorem. *If S is a pseudofunction whose Fourier coefficients are $O(\varepsilon_n)$ and whose Fourier series converges to* 0 *on the union of E and $B+D$ as m tends to infinity, then S is the null series.*

This is exactly the detour used in the note of Kahane and Katznelson.

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