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A SPACE WITH A LUSIN π-BASE WHOSE SQUARE HAS NO LUSIN π-BASE

MIKHAIL PATRAKEEV

Abstract. We construct a space X that has a Lusin π-base and such that X^2 has no Lusin π-base.

1. Introduction

The class of topological spaces with a Lusin π-base (see Definition 2.7) was introduced in [4]; this class equals the class of spaces with a π-tree [5, Remark 11]. In this paper, we build a space with a Lusin π-base whose square has no Lusin π-base (see Theorem 4.11).

The Baire space ω^ω, the Sorgenfrey line $\mathcal{S}$, and the irrational Sorgenfrey line $\mathcal{I}$ have a Lusin π-base [4] and [6], and all at most countable products of ω^ω, $\mathcal{S}$, and $\mathcal{I}$ also have a Lusin π-base [6]. If a space X has a Lusin π-base, then the products $X\times\omega^\omega$, $X\times\mathcal{S}$, and $X\times\mathcal{S}^\omega$ have a Lusin π-base [6], and also $X \setminus F$ has a Lusin π-base whenever $F \subseteq X$ is a σ-compact [5] (but a dense open subset of X can be without a Lusin π-base).

If a space X has a Lusin π-base, then X can be mapped onto an arbitrary nonempty Polish space by a continuous open map and also X can be mapped onto ω^ω by a continuous one-to-one map [4]. If a space X has a Lusin π-base, then it has a countable π-base and a countable pseudo-base (both with clopen members); and also X is a Choquet space (but it can be not strong Choquet even in a separable metrizable case).

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Key words and phrases. Baire space, Lusin π-base, Lusin scheme, π-tree, product of topological spaces, Sorgenfrey line, Souslin scheme.

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