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ON SPACES WITH σ-CLOSED-DISCRETE DENSE SETS

RODRIGO R. DIAS AND DÁNIEL T. SOUKUP

Abstract. The main purpose of this paper is to study e-separable spaces, originally introduced by Georges Kurepa as K_0' spaces; we call a space X *e-separable* if and only if X has a dense set which is the union of countably many closed discrete sets. We primarily focus on the behavior of e-separable spaces under products and the cardinal invariants that are naturally related to e-separable spaces. Our main results show that the statement "there is a product of at most $\mathfrak{c}$ many e-separable spaces that fails to be e-separable" is overinsistent with the existence of a weakly compact cardinal.

1. Introduction

The goal of this paper is to study a natural generalization of separability. Let us call a space X *e-separable* if and only if X has a dense set which is the union of countably many closed discrete sets. The definition is due to Georges Kurepa [18], who introduced this notion as property K_0' in his study of Souslin's problem. Later, e-separable spaces appear in multiple papers related to the study of linearly ordered and GO-spaces [11], [25], [26], [30]. In particular, M. J. Faber [11] showed that e-separable GO-spaces are perfect; however, whether the converse implication is true is famously open: is there, in ZFC, a perfect GO-space (or even just a perfect T_3 space) which is not e-separable? Let us refer the interested reader to a paper of Harold Bennett and David Lutzer [5] for more details and results on this topic.

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Key words and phrases. dense, d-separable, e-separable, K_0, separable, sigma-closed-discrete, weakly compact.

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