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CONNECTED OPEN NEIGHBORHOODS OF SUBCONTINUA OF PRODUCT CONTINUA WITH INDECOMPOSABLE FACTORS

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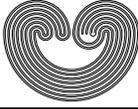
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ABSTRACT. In a product either of Knaster continua or of pseudo-arcs, a continuum W has arbitrarily small connected open neighborhoods if and only if the projection of W to every factor is onto. This is not true for all products of indecomposable continua.

1. INTRODUCTION

The general question considered here is the following: Suppose M is a subcontinuum of a product X of at least two nondegenerate indecomposable continua. Under what conditions does it follow that M has arbitrarily small connected open neighborhoods in X ? Precisely, when is it true that given any open set \mathcal{O} with $M \subseteq \mathcal{O} \subseteq X$, there exists a connected open set U satisfying $M \subseteq U \subseteq \mathcal{O}$? The particular cases to which we present solutions involve products of Knaster-type indecomposable continua, of solenoids, and of pseudo-arcs. Both positive and negative results are included, along with some open questions.

We did most of this research a number of years ago, but we held off on publishing it in the hope of getting improved results. The only result of this delay was the strengthening of Theorem 4.4 from the case of a product of two pseudo-arcs to all finite products (and, in light of the observation in §5, to all products of pseudo-arcs). Since the research in this paper was done, there has been a lot more progress in this area. Important work, especially, is contained in the papers of Janusz R. Prajs and Keith Whittington [13], [14], and to some extent, in the papers of Karen

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