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INDECOMPOSABLE INVERSE LIMITS ON $[0,1]$ WITH INTERVAL-VALUED FUNCTIONS

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Abstract. In the setting of one-dimensional inverse limits on $[0,1]$ with interval-valued bonding functions, we establish results for determining indecomposability of the inverse limit space. We characterize the full projection property for such inverse sequences. We provide conditions on the bonding functions that are sufficient for the inverse sequence to have the full projection property. We show that the full projection property is a necessary condition for indecomposability of the inverse limit. Solutions to four problems of W.T. Ingram are obtained.

1. Introduction

For ordinary inverse sequences on $[0,1]$, where the bonding functions are mappings, it is well-known that if the bonding mappings are wrappings [5, 18] or two-pass maps [7], the inverse limit is chainable and indecomposable. In [9], J.P. Kelly and J. Meddaugh define a natural generalization of wrappings to set-valued functions, calling such functions indecomposable. However, assuming each bonding function in a generalized inverse sequence on $[0,1]$ is indecomposable is not sufficient to have an indecomposable inverse limit. One must additionally determine if the inverse limit is a continuum, and if the inverse sequence has some type of full projection property. For us, an inverse sequence $\{X_i, f_i\}$ on continua with surjective upper semi-continuous bonding functions has the *full projection property* (fpp) provided that if K is a subcontinuum of $X = \varprojlim\{X_i, f_i\}$ such that $\pi_i(K) = X_i$ for infinitely many i, then $K = X$. Some authors call this the fpp for continua.

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