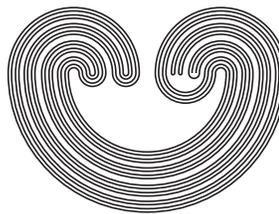


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## A CHARACTERIZATION OF TREE-LIKE INVERSE LIMITS ON $[0, 1]$ WITH INTERVAL-VALUED FUNCTIONS

by

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## A CHARACTERIZATION OF TREE-LIKE INVERSE LIMITS ON $[0, 1]$ WITH INTERVAL-VALUED FUNCTIONS

M. M. MARSH

**ABSTRACT.** We provide a characterization of tree-likeness in inverse limits on  $[0, 1]$  with interval-valued functions. We also show that flat spots, in certain inverse sequences, give rise to subcontinua of the inverse limit space that are either copies of subcontinua of the partial graphs in the inverse sequence or copies of products of subcontinua of the partial graphs and ordinary inverse limits.

In [15], the author provided necessary conditions and sufficient conditions for an inverse limit on  $[0, 1]$  with interval-valued bonding functions to be a tree-like continuum. Corollaries 27 and 28 of [15] give sufficient conditions for such inverse limits to have dimension larger than one. We show that one of the conditions in each of these two corollaries can be eliminated, thus providing a simply-stated characterization of tree-likeness in this setting (see Corollary 3). Under the same conditions that characterize tree-likeness of the inverse limit, we characterize the partial graphs (definition to follow) in this setting as  $\lambda$ -dendroids.<sup>1</sup>

Additionally, we show that if one of the continuum-valued bonding functions, in certain inverse sequences, has a flat spot, then the inverse limit space must contain either a copy of a subcontinuum of some partial graph in the inverse sequence or a copy of a product of a subcontinuum of a partial graph and an ordinary inverse limit on subcontinua of some of the factor spaces (see Theorem 1). This result is critical for establishing a lower bound for the dimension of the inverse limit space. Other results

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<sup>1</sup>Results in this paper were presented at the 2016 Spring Topology and Dynamics Conference, Waco, TX.

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