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A SIMPLE CONSTRUCTION OF NON-PLANAR ONE-DIMENSIONAL CONTINUA AS GENERALIZED INVERSE LIMITS

HAYATO IMAMURA

Abstract. Inverse limits of continuous maps on intervals are always one-dimensional planer continua. On the other hand, for every $n = 1, 2, \dots, \infty$, there exists generalized inverse limit with upper semi-continuous functions on intervals whose dimension is equal to n. In this paper, we give a simple construction of generalized inverse limits on intervals which are non-planar one-dimensional continua.

1. Introduction

Inverse sequences of continuous functions on compacta (= compact metric spaces) and inverse limits are fundamental tools of describing complicated continua and investigating dynamical systems of continuous functions. In order to study continua in 2004, Mahavier [11] introduced generalized inverse limits with set-valued functions on intervals. Later Ingram and Mahavier [6] generalized the notation to set-valued functions on compacta as follows.

Definition 1.1. For any $n \in \mathbb{N}$, let X_n be a compactum and let 2^{X_n} be the collection of all nonempty closed sets of X_n. Let $f_n : X_{n+1} \to 2^{X_n}$. An *inverse sequence* is defined as a sequence of pairs X_n and f_n, which is denoted by $\{X_n, f_n\}_{n\in\mathbb{N}}$. The *generalized inverse limit* $\varprojlim \{X_n, f_n\}$ of the inverse sequence $\{X_n, f_n\}_{n\in\mathbb{N}}$ is defined by

$$\varprojlim \{X_n, f_n\} := \left\{ (x_1, x_2, \dots) \in \prod_{n=1}^{\infty} X_n \;\middle|\; x_n \in f_n(x_{n+1}) \text{ for any } n \in \mathbb{N} \right\}.$$

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