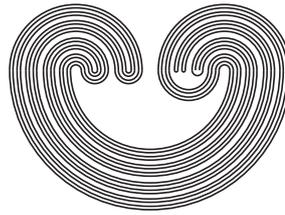


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## ON EVENTUAL COLORING NUMBERS

by

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## ON EVENTUAL COLORING NUMBERS

YUKI IKEGAMI, HISAO KATO, AND AKIHIDE UEDA

**ABSTRACT.** In [6], for each natural number  $p$  we defined eventual colorings within  $p$  of homeomorphisms which are generalizations of colorings of fixed-point free homeomorphisms, and we investigated the eventual coloring number  $C(f, p)$  of a fixed-point free homeomorphism  $f : X \rightarrow X$  with zero-dimensional set of periodic points. In [6], we constructed two indices  $\varphi_n(k)$  and  $\tau_n(k)$  for evaluating the eventual coloring number  $C(f, p)$ . The purpose of this paper is to construct a new index  $\psi_n(k)$  which is more appropriate than the indices  $\varphi_n(k)$  and  $\tau_n(k)$ .

### 1. INTRODUCTION

In this paper, we assume that all spaces are separable metric spaces and all maps are continuous functions. Let  $\mathbb{N}$  be the set of all natural numbers, i.e.,  $\mathbb{N} = \{1, 2, 3, \dots\}$ . For a separable metric space  $X$ ,  $\dim X$  denotes the covering dimension of  $X$ . For each map  $f : X \rightarrow X$ , let  $P(f)$  be the set of all periodic points of  $f$ , i.e.,

$$P(f) = \{x \in X \mid f^j(x) = x \text{ for some } j \in \mathbb{N}\}.$$

For a subset  $K$  of  $X$ ,  $\text{cl}(K)$ ,  $\text{int}(K)$  and  $\text{bd}(K)$  denote the closure, interior and the boundary of  $K$  in  $X$ , respectively. Let  $\mathcal{C}$  be a family of subsets of  $X$ . For each  $x \in X$ ,  $\text{ord}_x(\mathcal{C})$  denotes the number of elements of  $\mathcal{C}$  which contain  $x$ , i.e.,

$$\text{ord}_x(\mathcal{C}) = |\{C \in \mathcal{C} \mid x \in C\}|.$$

By a *swelling* of a family  $\{A_s\}_{s \in S}$  of subsets of a space  $X$ , we mean any family  $\{B_s\}_{s \in S}$  of subsets of  $X$  such that  $A_s \subset B_s$  ( $s \in S$ ) and for every

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