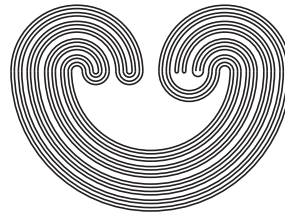


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## PERIODIC POINTS, INDUCED HYPERSPACE MAPS AND LI-YORKE CHAOS

by

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## PERIODIC POINTS, INDUCED HYPERSPACE MAPS AND LI-YORKE CHAOS

HÉCTOR MÉNDEZ AND LEONEL RITO

**ABSTRACT.** Let  $X$  be a continuum, and let  $f : X \rightarrow X$  be a homeomorphism. Let  $2^X$  be the hyperspace of all nonempty compact subsets of  $X$  endowed with the Hausdorff metric. Let  $C(X) \subset 2^X$  be the collection of all subcontinua of  $X$ . Let  $2^f : 2^X \rightarrow 2^X$  be the induced map defined by  $2^f(A) = f(A)$ , and let  $C(f)$  be the restriction of  $2^f$  to  $C(X)$ . Let  $Per(f)$  and  $R(f)$  be the set of all periodic points of  $f$  and the set of all recurrent points of  $f$  respectively. In this note we prove the following: If  $f : X \rightarrow X$  is a dendrite homeomorphism with  $R(f) = X$ , then the induced homeomorphism  $2^f$  has no Li-Yorke pairs. In the second part we produce a dendroid homeomorphism  $f : X \rightarrow X$  such that  $Per(f) = X$ , and the induced map  $C(f)$  is chaotic in the sense of Li-Yorke, that is, there exists an uncountable subset  $S$  of  $C(X)$ , such that for each pair  $A, B \in S$ , with  $A \neq B$ ,  $(A, B)$  is a Li-Yorke pair of  $C(f)$ .

### 1. INTRODUCTION AND SOME DEFINITIONS

Let  $X$  be a compact metric space, and let  $f : X \rightarrow X$  be a continuous function. The pair  $(X, f)$  is a discrete dynamical system. Let  $\mathbb{N}$  denote the set of all positive integers. For each  $n \in \mathbb{N}$ , let  $f^n : X \rightarrow X$  denote the  $n$ -th composition of  $f$ . A point  $x \in X$  is said to be:

- (i) a *fixed point* of  $f$  if  $f(x) = x$ ;

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