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Average shadowing and persistence in pointwise dynamics

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ABSTRACT

We introduce average shadowable measures and almost average shadowable measures for continuous maps of compact metric spaces and weakly topologically stable points and average persistent property for homeomorphisms of compact metric spaces. We prove that the set of all average shadowable measures is dense in the space of all Borel probability measures if and only if the set of all average shadowable points is dense in the phase space and every almost average shadowable measure can be weak* approximated by measures having support equal to the closure of the set of all average shadowable points. Moreover, we prove that every minimally expansive point which is either persistent or α-persistent is weakly topologically stable and every mean equicontinuous pointwise weakly topologically stable homeomorphism is average persistent.

1. Introduction

In pointwise dynamics, one aims to explore the behavior of dynamical systems by studying the global dynamical notions and their variants at a point. In [21], Reddy has initiated this field by introducing expansive points for homeomorphisms, and interesting notion studied in [19] has made this field a trending area of research. In [19], author has introduced shadowable points for homeomorphisms and has proved that a homeomorphism of a compact metric space has shadowing property [1] if and only if each point of the phase space is shadowable. In [25], author has introduced almost shadowable measures and has studied the relations among the set of all shadowable points, the set of all shadowable measures [16] and the set of all almost shadowable measures. In [4], Blank has introduced a global variant of shadowing property, namely average shadowing property to study various chaotic dynamical systems. In [22], author has characterized Anosov diffeomorphism by using the average shadowing property. In [15], authors have proved that the average shadowing property is equivalent to specification property and topologically mixing for continuous

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