

PERSISTENCE AND CW-TOPOLOGICAL STABILITY FOR
SET-VALUED MAPS

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ABSTRACT. In this paper, we introduce α -persistent property and cw-topological stability for upper-semicontinuous closed-valued set-valued maps on a compact metric space. We prove that α -persistent property and positive pseudo-orbit tracing property are equivalent notions irrespective of the map considered. We further establish that every upper-semicontinuous closed-valued map with positive pseudo-orbit tracing property is cw-topologically stable provided the induced shift map on the inverse limit space is positive continuum-wise expansive and we use this to give sufficient condition under which positive pseudo-orbit tracing property, α -persistent property and cw-topological stability become equivalent notions. We give necessary examples to support the results.

1. INTRODUCTION

In [10], Utz has introduced expansive homeomorphisms which says that any two distinct orbits can be made a constant distance apart at some instant of integer time. In [4], Kato has defined a weaker form of expansivity known as continuum-wise expansive homeomorphisms which says that the orbits of non-trivial continua can be expanded up to the fixed diameter. In [3, 8, 13], the authors have introduced these properties for set-valued maps and extended several results of autonomous systems in this setting.

In [9], the authors have introduced shadowing property also known as positive pseudo-orbit tracing property for set-valued maps which extends the classical shadowing property

Key words and phrases. continuum-wise expansivity, α -persistence, pseudo-orbit tracing property, cw-topological stability, set-valued maps.

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