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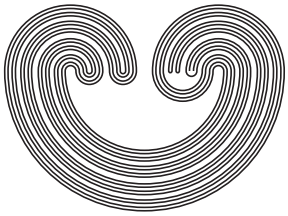

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Study of Transitivity Through Steepness

by

V. Kannan, R. Basu, K. Sannyasi, and N. Unnikrishnan

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STUDY OF TRANSITIVITY THROUGH STEEPNESS

V. KANNAN, R. BASU, K. SANNYASI, AND N. UNNIKRISHNAN

Abstract. The aim of this work is to provide some simple sufficient conditions for topological transitivity of piecewise monotone maps on $[0, 1]$. Here we introduce a steepness condition that will imply that the map is expanding (in the sense that for every interval, the length of its image is greater than the length of that interval, unless the image is the whole space), and then we prove that these expanding maps are transitive. The theorems stated in this paper improve some known recent results. Moreover, they are simpler to state.

1. Introduction

Discrete dynamical systems arise as mathematical models of any motion obeying a rule that does not change with time. The rough idea behind transitivity is that we like to require any point in the phase space to visit every portion of the space in the course of time. Because points are seldom handled accurately, due to round-off errors and computational errors, we modify our requirement: Every neighborhood of every point visits every region at some time or other. Consequently, such a dynamical system cannot be decomposed into two disjoint sets with nonempty interiors which do not interact under the transformation. Thus, transitivity in some sense is irreducibility.

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