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Dynamics of doubly stochastic quadratic operators on a finite-dimensional simplex

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Abstract

The present paper focuses on the dynamics of doubly stochastic quadratic operators (d.s.q.o) on a finite-dimensional simplex. We prove that if a d.s.q.o. has no periodic points then the trajectory of any initial point inside the simplex is convergent. We show that if d.s.q.o. is not a permutation then it has no periodic points on the interior of the two dimensional (2D) simplex. We also show that this property fails in higher dimensions. In addition, the paper also discusses the dynamics classifications of extreme points of d.s.q.o. on two dimensional simplex. As such, we provide some examples of d.s.q.o. which has a property that the trajectory of any initial point tends to the center of the simplex. We also provide an example of d.s.q.o. that has infinitely many fixed points and has infinitely many invariant curves. We therefore came-up with a number of evidences. Finally, we classify the dynamics of extreme points of d.s.q.o. on 2D simplex.

Keywords

Author Keywords: [Doubly stochastic quadratic operators](#); [Fixed point](#); [Trajectory](#); [Extreme point](#); [Simplex](#)

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