

# Smoothness of Solutions and Harnack Inequality for Kimura Diffusion Operators

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## Abstract

Motivated by applications to population genetics, we consider a boundary-degenerate elliptic operator, the so-called Kimura diffusion operator. We prove that the solutions of the homogeneous initial-value parabolic problem defined by the Kimura operator with continuous initial data, become smooth up to the boundary of the domain. In addition, we prove that the nonnegative solutions satisfy the Harnack inequality. The difficulty of studying the smoothness of solutions and the Harnack inequality comes from the degeneracy of the operator. Our method of the proof is based on arguments specific to stochastic analysis. This is joint work with Charles Epstein.