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DISCRETE PROBABILITY MEASURES ON 2×2 STOCHASTIC MATRICES AND A FUNCTIONAL EQUATION ON $[0, 1]$

A. Mukherjea
J. S. Ratti

Abstract: In this paper, we consider the following natural problem: suppose μ_1 and μ_2 are two probability measures with finite supports $S(\mu_1), S(\mu_2)$ respectively, such that $|S(\mu_1)| = |S(\mu_2)|$ and $S(\mu_1) \cup S(\mu_2) \subset 2 \times 2$ stochastic matrices, and μ_1^n (the n-th convolution power of μ_1 under matrix multiplication), as well as μ_2^n, converges weakly to the same probability measure λ, where $S(\lambda) \subset 2 \times 2$ stochastic matrices with rank one. Then when does it follow that $\mu_1 = \mu_2$? What if $S(\mu_1) = S(\mu_2)$? In other words, can two different random walks, in this context, have the same invariant probability measure? Here, we consider related problems.

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