

Department of Mathematical Sciences
The Johns Hopkins University

SEMINAR

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162 Mattin Center
Refreshments: 10:45 a.m.
Seminar: 11:00 a.m.

ON THE CONTINUOUS SINGULARITY OF THE LIMIT DISTRIBUTION
OF PRODUCTS OF I.I.D. d -BY- d STOCHASTIC MATRICES

ABSTRACT

We will consider the old problem (still open) of finding when the limit distribution of products of i.i.d. d -by- d (d being 2 or larger) random stochastic matrices is continuous singular, when the support of the individual random matrices is finite or countable. Proofs are based on applications of the multivariate central limit theorem.

When $d = 2$ and the support has only two elements with first columns $(t, 0)$ and $(1, 1 - t)$, $0 < t < 1$, each with probability $1/2$, the limit distribution function is also the distribution function of the infinite random power series where the n th term is $(1 - t)Y(n)[t^n]$, $0 \leq n < \infty$, the $Y(n)$'s being i.i.d. 0 or 1 with equal probability. For $t < 1/2$, the distribution is continuous singular. For $t = 1/3$, it is the Cantor function. For $t = 1/2$, it is the uniform distribution. Erdős showed that there exists s between $1/2$ and 1 such that it is absolutely continuous for almost all t in the interval $(s, 1)$. Solomyak showed that it is absolutely continuous for almost all t in the interval $(1/2, 1)$. **Conjecture:** It is absolutely continuous for all but countably many points in the interval $(1/2, 1)$.

We will consider the question when $d > 2$.