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Stochastic determination of moduli of annular regions and tori. (English) Zbl 0606.30041
Ann. Probab. 14, 1404-1410 (1986).

Let $A = A(r, 1)$ be an annulus $\{z : r < |z| < 1\}$ with the Poincaré metric g on A . Let $\mathbb{Z} = (Z_t, P_\alpha)$ be a Brownian motion on A corresponding to g . If we take a geodesic disc D centered at c in A , then the probability $P_\alpha(\exists t, Z_t \in \partial D \text{ such that } Z_s, 0 < s < t, \text{ winds around the origin in the positive direction})$ is a function of r , $|c|$, and the radius ρ of D . In the present paper we shall calculate the value S of the supremum of these winding probabilities. Then it will turn out that there exists a 1 to 1 correspondence between S and r . Noting that r is called the modulus of A , we have an explicit formula of moduli of annular regions. Further we shall give an explicit formula of moduli of tori in a similar way.

MSC:

30F20 Classification theory of Riemann surfaces

58J65 Diffusion processes and stochastic analysis on manifolds

Keywords:

Poincaré metric; Brownian motion; geodesic

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