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RATE ANALYSIS OF MASSIVE MIMO SYSTEM USING STOCHASTIC GEOMETRIC MODEL

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ABSTRACT

The rate performance of massive multiple input multiple output (MIMO) system has been analyzed in the hexagonal model with deterministically placed users, which is too idealized and lacks rigorous theoretical analysis. This paper focuses on the downlink rate performance analysis on the massive MIMO system. Two general stochastic geometric models are employed owing to their tractability, i.e., Gilbert disk model and Voronoi tessellation model. Expressions for downlink average ergodic rate are derived in the general case and then simplified in the special case with definite path loss exponent. The simulation results of both models show that increasing the number of available pilots in each cell and the ratio of base stations (BS) density to user equipment (UE) density can improve the downlink average rate per UE. Furthermore, we compare the downlink rate results in these two models and observe that, pilot contamination in the Gilbert disk model is severer than that in the Voronoi tessellation model.

KEYWORDS: Massive MIMO, Stochastic Geometric Model, Pilot Contamination, Average Achievable Rate, Wireless Network