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| **Abstract:** |  |
| In this context, the utilization of multiple-input multiple-output (MIMO) and non-orthogonal multiple access (NOMA) technologies is applied to improve wireless communication. This paper is dedicated to the evaluation of the performance in the MIMO-NOMA system under Nakagami-m fading environments, which is a more general scenario for different kinds of fading conditions that occur normally. Our proposed framework is applied to evaluate key performance metrics, including bit error rate (BER), outage probability, spectral efficiency, and ergodic capacity. The results reveal the deep impact of Nakagami-m fading on these key performance metrics, emphasizing an intricate balance between reliability and spectral efficiency that is achieved through power domain multiplexing in conjunction with successive interference cancellation (SIC). Our results are further evidence of the strength and flexibility of MIMO-NOMA, and point to insights and practical guidelines that are new towards the optimization of next-generation wireless networks. This overall analysis not only closes the gap in current literature on the subject but also sets a new benchmark for future research on advanced communication technologies. | |