Reconfigurable Intelligent Surface Assisted DOA Estimation under Strong Interference

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Abstract

Reconfigurable intelligent surface (RIS) has attracted a lot of attention due to its capability to intelligently change the wireless propagation environment. However, the accuracy of direction of arrival (DOA) estimation in strong interference environment will be seriously affected. In this paper, a RIS aided system for DOA estimation is developed and analysed for non-line-of-sight (NLOS) scenarios. Unlike traditional DOA estimation systems, a low-cost system with only one full-functional receiver is given by changing the phases of the reflected signals at the RIS elements to realize the multiple measurements. Moreover, a new method based on the corrected projection jam algorithm is proposed for the DOA estimation by constructing the orthogonal projection matrix of the jamming subspace as a block matrix, so as to constrain the strong interferences. Furthermore, the phase shift matrix design of RIS elements is transformed into a specific objective optimization problem and then solved by fractional programming. Simulation results show that the proposed method achieves computational complexity in the RIS-aided strong interference system with only one receiving channel than various benchmark schemes.

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