

Number of Transmit Antennas Detection using Time-Diversity of the Fading Channel

Abstract:

Detection of the number of transmit antennas plays an important role in the design of adaptive multi antenna wireless communication systems. This paper develops a detection algorithm based on second and fourth order statistics of the received signal and time-varying nature of the wireless channel. In contrast to existing feature-based algorithms, the proposed algorithm does not require a priori information about the transmitted signals, such as coding scheme, modulation type, and pilot patterns. Unlike information theoretic algorithms, it does not require the number of receive antennas to be larger than that of transmit antennas. In fact, the proposed algorithm is capable of operating with a single receive antenna even for large numbers of transmit antennas. The performance analysis of the proposed algorithm is provided, and the results are verified through simulations. The algorithm exhibits a good performance over a wide range of signal to noise ratios, and is robust to the carrier frequency and timing offsets.