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Hybrid MMSE Precoding for Millimeter-Wave (mmW) Multi-user Massive MIMO Systems

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Abstract

Millimeter-wave (mmWave) cellular systems is considered to be the key enabling technology for the future 5G wireless communication systems because of its high data rates, low latency, high system capacity, and huge available bandwidths. However, in order to meet the increasing demand, mmWave communications need to overcome certain challenges including high path loss and interference which can be reduced by applying large antenna arrays to achieve high beamforming gains. Although multi-user beamforming can improve spectral efficiencies, full digital beamforming strategies used in the conventional microwave systems increase the hardware cost and consumes high power for large number of antennas in mmW systems. In this paper, a multi-user hybrid precoding structure is proposed for mmWave massive-MIMO channels utilizing MMSE precoders at the BS with perfect channel knowledge. Simulations show that the sum-rate obtained by the proposed hybrid precoding scheme is nearly similar to the single-user rate and also performs better compared to other hybrid precoding approaches.

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