

Digital Joint Equivalent Channel Hybrid Precoding for Millimeterwave Massive Multiple Input Multiple Output Systems

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Abstract : Aiming at the problem that the spectral efficiency of hybrid precoding (HP) is too low in the current millimeter wave (mmWave) massive multiple input multiple output (MIMO) system, this paper proposes a digital joint equivalent channel hybrid precoding algorithm, which is based on the introduction of digital encoding matrix iteration. First, the objective function is expanded to obtain the relation equation, and the pseudo-inverse iterative function of the analog encoder is derived by using the pseudo-inverse method, which solves the problem of greatly increasing the amount of computation caused by the lack of rank of the digital encoding matrix and reduces the overall complexity of hybrid precoding. Secondly, the analog coding matrix and the millimeter-wave sparse channel matrix are combined into an equivalent channel, and then the equivalent channel is subjected to Singular Value Decomposition (SVD) to obtain a digital coding matrix, and then the derived pseudo-inverse iterative function is used to iteratively regenerate the simulated encoding matrix. The simulation results show that the proposed algorithm improves the system spectral efficiency by 10~20% compared with other algorithms and the stability is also improved.

Keywords : mmWave, massive MIMO, hybrid precoding, singular value decomposing, equivalent channel

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