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Massive MIMO Systems: SOMA technique, and cell-free approach with limited fronthaul capacity

Dr. Mohammad Javad Emadi
Amirkabir University of Technology (Tehran Polytechnic)

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The key promising benefit of massive MIMO (mMIMO) systems is to enable enhanced sum-rate, since for radio channels with a long enough coherence interval, a large number of users with a negligible cross-talk could be served over shared time–frequency resources. In the first part of the presentation, uplink scenario of single-cell multi-user mMIMO communication systems with a semi-orthogonal multiple access (SOMA) technique is considered, and optimal resource allocation parameters; e.g., pilot and data transmit power and training duration, which maximize the achievable sum-rates are discussed. Our results indicate that the optimized SOMA encouragingly outperforms the optimized conventional time-division duplex protocol in terms of both energy- and spectral efficiency. In the second part, cell-free mMIMO system with limited capacity fronthaul links which connect the access points (APs) to the central processing unit (CPU) is introduced. Performance of the system for different strategies to transfer channel state information and data signal to the CPU along with realistic assumption of transceiver hardware impairment are discussed.