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Optimal linear precoding for finite alphabet signaling in wireless systems and networks

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Diskussionsleitung: Prof. Dr.-Ing. R. Schober

Finite alphabet signaling refers to commonly used discrete-constellation modulations in practical communication systems, such as PAM, PSK or QAM. In this talk, we will target at how to increase data rate or throughput via linear precoding in wireless systems and networks such as multiple-input multiple-output (MIMO) systems, multiple access channels, broadcast channels, wiretap channels, and cognitive radio networks. We will present backgrounds, theoretical results, hardware implementation, and experimental results for maximizing the mutual information-based achievable data rate or throughput. Our results demonstrate that precoding for finite alphabet signaling can be radically different from the precoding (or power allocation) for Gaussian signaling. Our examples show that the finite-alphabet signaling-based approach provides not only higher achievable data rate but also lower coded bit error rate than the approaches that design the precoder with Gaussian input assumption. Further research topics will be discussed in this talk as well.