



Nearly Doubling the Throughput of Multiuser MIMO Systems Using Codebook Tailored Limited Feedback Protocol

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We present and analyze a new robust feedback and transmit strategy for multiuser MIMO downlink communication systems, termed Rate Approximation (RA). RA combines the flexibility and robustness needed for reliable communications with the user terminal under a limited feedback constraint. It responds to two important observations. First, it is not so significant to approximate the channel but rather the rate, such that the optimal scheduling decision can be mimicked at the base station. Second, a fixed transmit codebook at the transmitter is often better when therefore the channel state information is more accurate. In the RA scheme the transmit and feedback codebook are separated and user rates are delivered to the base station subject to a controlled uniform error. The scheme is analyzed and proved to have better performance below a certain interference plus noise margin and better behavior than the classical Jindal formula. LTE system simulations sustain the analytic results showing performance gains of up to 50% or 70% compared to zeroforcing when using multiple antennas at the base station and multiple antennas or a single antenna at the terminals, respectively. A new feedback protocol is developed which inherently considers the transmit codebook and which is able to deal with the complexity issue at the terminal.

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