

Grassmannian Delay-Tolerant Limited Feedback for Interference Alignment

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Abstract:

We propose a delay-tolerant limited feedback algorithm for single-input single-output (SISO) interference alignment. The temporal correlation and band limitation of the time-selective fading process is exploited to model the channel impulse response with a low-dimensional basis expansion. The algorithm tracks and feeds back the evolution of the basis expansion coefficients on the Grassmannian manifold. These coefficients allow the transmitter to predict the future channel realizations to compensate the feedback delay. By feeding back the quantized basis expansion coefficients instead of the channel impulse responses, the number of feedback bits can be substantially reduced. Our numerical results demonstrate that by exploiting the subspace structure of the time-variant channel we can reduce the amount of feedback to 2 bits per channel realization.