Designing PSAM schemes: How optimal are SISO pilot parameters for spatially correlated SIMO?

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Abstract
We study the design parameters of pilot-symbol-assisted modulation (PSAM) schemes for spatially correlated single-input multiple-output (SIMO) systems in time-varying Gauss-Markov flat-fading channels. We use an information capacity lower bound as our figure of merit. We investigate the optimum design parameters, including the ratio of power allocated to the pilots and the fraction of time occupied by the pilots, for SIMO systems with different antenna sizes and with spatial channel correlation. Our main finding is that by optimally designing the training parameters for single-input single-output (SISO) systems, the same parameters can be used to achieve near optimum capacity in both spatially independent and correlated SIMO systems for the same fading rate and signal-to-noise ratio (SNR). In addition, we show that spatially independent channels give the lowest capacity at sufficiently low SNR. These findings provide insights into the design of practical PSAM systems.

Index Terms
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