Journal Watch
Trans. Information theory
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Outage Analysis of Block-Fading Gaussian Interference Channels

Yang Weng and Daniela Tuninetti

- Problem: DMT for block fading Gaussian Interference channels
- Ingredient for DMT analysis: The capacity region
- Problem! Capacity region not known!
- Outer bounds: inspired by the capacity to within one bit results of Etkin et al
- Inner bounds: HK with and without rate splitting
- How different is the problem? The channel is asymmetric
- Conclusions: DMT obtained using the analysis in the paper is the DMT for many cases!

Compute-and-Forward: Harnessing Interference Through Structured Codes

Bobak Nazer and Michael Gastpar

- System model: L transmitter with L independent messages, M relays and one receiver
- Problem: How do you transmit the message reliably? What should be the relays strategy?
- Exploit the interference! How?
- Decode a linear combination of the message at the relays (Compute)
- Why? better rate of communication for transmitting linear combination!
- Transmit the decoded bits using structured lattice codes
- Design parameters: coefficient vector, decoding matrix
- Result: higher data rate

On Communication Over Unknown Sparse Frequency-Selective Block-Fading Channels

Arun Pachai Kannu and Philip Schniter

- Model: Sparse frequency selective channel; no. of taps = L which is S-sparse with unknown support
- Results: the capacity pre-log factor is 1-S/N (non coherent case)
- Pilot-Aided Transmission (PAT) + Data-aided Support Decoder (DASD) results in a pre-log factor of 1-S/N using an OFDM strategy
- Existing result: compressed OFDM channel Sensing requires O(S (ln (N)) ^5) pilots without noise and 2S pilots in the absence of noise (you can see the improvement!)
- Using S+1 pilots, complexity can be reduced! (I did not get this point!)

Joint Transmission and State Estimation: A Constrained Channel Coding Approach

Wenyi Zhang, Satish Vedantam, and Urbashi Mitra

- Model: $Y = HX + Z$; X – data, H – channel state, and Z – AWGN
- Goal of the receiver: Decode X and estimate H
- Question: what is the maximum data rate for a given distortion of D
- Answer: Use non coherent detector to detect the data, and use this as pilots to estimate the channel
- The above scheme is capacity distortion optimal!