Journal Watch
IEEE Trans. Communications
Feb. 2017

Chandra R. Murthy

HARQ and AMC: Friends or Foes?

- R. Sassioui, M. Jabi, L. Szczecinski, L. B. Le, M. Benjillali, B. Pelletier
- Benefits of combining AMC and HARQ w.r.t. throughput
- Slow fading channels: HARQ improves the throughput of AMC but only marginally (slightly better when AMC accounts for HARQ in its design)
- Fast fading channels: HARQ beneficial at low SNRs, but detrimental to AMC at high SNRs (when the AMC is designed without considering HARQ)
- Modification of HARQ: terminate it depending on the AMC index – requires no change of AMC protocol and prevents loss of throughput in fast fading channels

Tightness of Jensen's Bounds and Applications to MIMO Communications

- J. Yuan, M. Matthaiou, S. Jin, F. Gao
- MIMO capacity bounds: typically use Jensen's inequality
  - Too hard to manipulate log(1+eigenvalue) expression
- Study the tightness of Jensen's inequality via "sandwich thm."
  - A. H. Stone and J. W. Tukey, "Generalized sandwich theorems," *Duke Math. J.*, vol. 9, no. 2, pp. 356–359, Jun. 1942.
- How is Jensen's used?

$$\mathcal{J}_1 \triangleq \begin{cases} C^{\mathrm{su}} \leqslant m\log_2\left(1+\frac{\rho}{N_t}E\left[\lambda\right]\right), \\ C^{\mathrm{su}} \geqslant m\log_2\left(1+\frac{\rho}{N_t E\left[\lambda^{-1}\right]}\right), \end{cases}$$

$$\mathcal{J}_2 \triangleq \begin{cases} C^{\mathrm{su}} \leqslant E_{\mathbf{\Phi}}\left[\log_2\left(\frac{\rho}{N_t}\det\left(\mathbf{\Phi}\right)\right)\right] \\ \qquad\qquad +m\log_2\left(1+\frac{N_t}{\rho}E\left[\lambda^{-1}\right]\right) \\ C^{\mathrm{su}} \geqslant E_{\mathbf{\Phi}}\left[\log_2\frac{\rho}{N_t}\det\left(\mathbf{\Phi}\right)\right]+m\log_2\left(1+\frac{N_t}{\rho E[\lambda]}\right). \end{cases}$$

- Analyze the gap between the upper and lower bounds using new results on finite dimensional Wishart matrices

Transmit Beamforming and Power Control for Optimizing the Outage Probability Fairness in MISO Networks

- X. Zhai, C. W. Tan, Y. Huang, B. D. Rao
- Joint beamforming and power control in MU-MISO with only channel distribution information, i.e., covariance matrices
- Minimize max. outage prob. under wtd. sum power constraint
- Nonconvex and nonlinear problem
  - Assuming a fixed beamformer set, use nonlinear Perron-Frobenius theory to design a decentralized algorithm to compute optimal power
  - “Certainty-equivalent margin counterpart” with outage-mapped thresholds: decouples the beamformer and power variables.
  - Yields a near-optimal feasible beamformer and power allocation

A Novel Hybrid Beamforming Algorithm With Unified Analog Beamforming by Subspace Construction Based on Partial CSI for Massive MIMO-OFDM Systems

- D. Zhu, B. Li, P. Liang
- Claim: previous hybrid BF useful for single-user systems; does not extend to multiple users served on different subcarriers
  - Analog BF part is common to all users and all subcarriers
- Propose HB algo: analog part based on covariance info
  - Achieves 95% performance of full digital BF
- Algo for estimating the spatial covariance matrix
  - Achieves 97% performance of perfect SCM case
- Useful in TDD and FDD

On Adaptive Power Control for Energy Harvesting Communication Over Markov Fading Channels

- M. B. Khuzani, H. E. Saffar, P. Mitran

On Optimality of Myopic Policy in Multi-Channel Opportunistic Access

- K. Wang, L. Chen, J. Yu

Low Complexity Iterative Receiver Design for Sparse Code Multiple Access

- F. Wei and W. Chen