

References

- [1] E. Biglieri, R. Calderbank, A. Constantinides, A. Goldsmith, A. Paulraj, and H.V.Poor, *MIMO wireless communications*. Cambridge University Press, 2007.
- [2] J. H. Winters, "On the capacity of radio communication systems with diversity in a rayleigh fading environment," *IEEE J. Sel. Areas Commun.*, vol. 5, pp. 871–878, Jun. 1987.
- [3] E. Telatar, "Capacity of multiantenna gaussian channels," *AT&T Bell Laboratories, Tech. Memo*, 1995.
- [4] G. J. Foschini, "Layered spacetime architecture for wireless communication in a fading environment when using multielement antennas," *Bell Labs Tech. Journ.*, pp. 41–59, 1996.
- [5] G. J. Foschini and M. J. Gans, "On limits of wireless communications in a fading environment when using multiple antennas," *Wireless Pers. Commun.*, vol. 6, pp. 311–335, Mar. 1998.
- [6] H. Bolcskei and A. Paulraj, "Space-frequency coded broadband ofdm systems," in *Proc. IEEE International Conference on Wireless Communications and Networking (WCNC'00)*, Chicago, IL, Sep. 2000, pp. 1–6.
- [7] S. M. Alamouti, "A simple transmit diversity technique for wireless communications," *IEEE J. Sel. Areas Commun.*, vol. 16, no. 8, pp. 1451–1458, Oct. 1998.

- [8] V. Tarokh and H. Jafarkhani, "Space-time block codes from orthogonal designs," *IEEE Trans. Inf. Theory*, vol. 45, no. 5, pp. 1456–1467, Jul. 1999.
- [9] H. E. Gamal and M. O. Damen, "Universal space-time coding," *IEEE Trans. Inf. Theory*, vol. 49, no. 5, pp. 1097–1119, May 2003.
- [10] W. Su, Z. Safar, and K. J. R. Liu, "Obtaining full-diversity space-frequency codes from space-time codes via mapping," *IEEE Trans. Signal Process.*, vol. 51, no. 11, pp. 2905–2916, Nov. 2003.
- [11] W. Su, Z. Safar, M. Olfat, and K. J. R. Liu, "Full-rate full-diversity space-frequency codes with optimum coding advantage," *IEEE Trans. Inf. Theory*, vol. 51, no. 1, pp. 229–249, Jan. 2005.
- [12] Q. Li, G. Li, W. Lee, M. il Lee, D. Mazzaresse, B. Clerckx, and Z. Li, "MIMO techniques in WiMAX and LTE: a feature overview," *IEEE Commun. Mag.*, vol. 48, no. 5, pp. 86–92, May 2010.
- [13] D. J. Love and R. W. H. Jr., "Limited feedback unitary precoding for orthogonal space-time block codes," *IEEE Trans. Signal Process.*, vol. 53, no. 4, pp. 64–73, Jan. 2005.
- [14] J. N. Laneman, D. N. C. Tse, and G. W. Wornell, "Cooperative diversity in wireless networks: Efficient protocols and outage behavior," *IEEE Trans. Inf. Theory*, vol. 50, no. 12, pp. 3062–3080, Dec. 2004.
- [15] G. Jongren, M. Skoglund, B. Ottersten, and W. Y. Kuo, "Combining beamforming and orthogonal spacetime block coding," *IEEE Trans. Inf. Theory*, vol. 48, no. 3, pp. 611–6277, Mar. 2002.
- [16] M. Vu and A. Paulraj, "Optimal linear precoders for mimo wireless correlated channels with nonzero mean in space-time coded systems," *IEEE Trans. Signal Process.*, vol. 54, no. 6, pp. 2318–2332, Jun. 2006.

- [17] M. R. Bhatnagar and A. Hjørungnes, "Linear precoding of stbc over correlated rician mimo channels," *IEEE Trans. Wireless Commun.*, vol. 9, no. 6, pp. 1832–1836, Jun. 2010.
- [18] S. Zhou and G. B. Giannakis, "Optimal transmitter eigen-beamforming and space-time block coding based on channel mean feedback," *IEEE Trans. Signal Process.*, vol. 50, no. 10, pp. 2599–2613, Oct. 2002.
- [19] A. Pascual-Iserte and D. P. Palomar, "A robust maximin approach for mimo communications with imperfect channel state information based on convex optimization," *IEEE Trans. Signal Process.*, vol. 54, no. 1, pp. 346–360, Jan. 2006.
- [20] E. Visotsky and U. Madhow, "Space-time transmit precoding with imperfect feedback," *IEEE Trans. Inf. Theory*, vol. 47, no. 6, pp. 2632–2639, Sep. 2001.
- [21] S. A. Jafar and A. Goldsmith, "Transmitter optimization and optimality of beamforming for multiple antenna systems," *IEEE Trans. Wireless Commun.*, vol. 3, no. 4, pp. 1165–1172, Jul. 2004.
- [22] H. Sampath and A. Paulraj, "Linear precoding for space-time coded systems with known fading correlations," *IEEE Commun. Lett.*, vol. 6, no. 6, pp. 239–241, Jun. 2002.
- [23] A. Hjørungnes and D. Gesbert, "Precoding of space-time block coded signals for joint transmit-receive correlated mimo channel," *IEEE Trans. Wireless Commun.*, vol. 5, no. 3, pp. 492–497, Mar. 2006.
- [24] S. Zhou and G. B. Giannakis, "Optimal transmitter eigen-beamforming and space-time block coding based on channel correlations," *IEEE Trans. Inf. Theory*, vol. 49, no. 7, pp. 1673–1690, Jul. 2003.
- [25] A. Hjørungnes and D. Gesbert, "Precoding of orthogonal space-time block codes in arbitrarily correlated mimo channels: iterative and closed-form solutions," *IEEE Trans. Wireless Commun.*, vol. 6, no. 3, pp. 1072–1082, Mar. 2007.

- [26] M. V. Bhatnagar, A. Hjørungnes, and L. Song, "Precoded differential orthogonal space-time modulation over correlated rician mimo channels," *IEEE J. Sel. Areas Signal Process.*, vol. 2, no. 2, pp. 124–134, Apr. 2008.
- [27] S. Ekbatani and H. Jafarkhani, "Combining beamforming and space-time coding using quantized feedback," *IEEE Trans. Wireless Commun.*, vol. 7, no. 3, pp. 898–908, Mar. 2008.
- [28] —, "Combining beamforming and space-time coding using noisy quantized feedback," *IEEE Trans. Commun.*, vol. 7, no. 5, pp. 1280–1286, May 2009.
- [29] P. Xia and G. B. Giannakis, "Design and analysis of transmit-beamforming based on limited-rate feedback," *IEEE Trans. Commun.*, vol. 54, no. 5, pp. 1165–1172, May 2006.
- [30] W. Santipach and M. L. Honig, "Capacity of a multiple-antenna fading channel with a quantized precoding matrix," *IEEE Trans. Commun.*, vol. 53, no. 3, pp. 1218–1235, Mar. 2009.
- [31] Y. Fu, W. A. Krzymien, and C. Tellambura, "Precoding for orthogonal space-time block-coded ofdm downlink: mean or covariance feedback?" *IEEE Trans. Veh. Technol.*, vol. 58, no. 7, pp. 3263–3270, Sep. 2009.
- [32] P. Xia, S. Zhou, and G. B. Giannakis, "Adaptive mimo-ofdm based on partial channel state informations," *IEEE Trans. Signal Process.*, vol. 52, no. 1, pp. 202–213, Jan. 2004.
- [33] G. Barriac and U. Madhow, "Space-time precoding for mean and covariance feedback: application to wideband ofdm," *IEEE Trans. Commun.*, vol. 54, no. 1, pp. 96–107, Jan. 2006.
- [34] A. K. Sadek, W. Su, and K. J. R. Liu, "Transmit beamforming for space-frequency coded mimo-ofdm systems with spatial correlation feedback," *IEEE Trans. Commun.*, vol. 56, no. 10, pp. 1647–1655, Oct. 2008.

- [35] E. Yoon, J. Hansen, and A. Paulraj, "Space-frequency precoding with space-tap correlation information at the transmitter," *IEEE Trans. Commun.*, vol. 55, no. 9, pp. 1702–1711, Sep. 2007.
- [36] H. R. Bahrami and T. Le-Ngoc, "Mimo precoder designs for frequency-selective fading channels using spatial and path correlation," *IEEE Trans. Veh. Technol.*, vol. 57, no. 6, pp. 3441–3452, Nov. 2008.
- [37] L. Liu and H. Jafarkhani, "Successive transmit beamforming algorithms for multiple-antenna ofdm systems," *IEEE Trans. Wireless Commun.*, vol. 6, no. 4, pp. 1512–1522, Apr. 2007.
- [38] J. Choi and R. Heath, "Interpolation based transmit beamforming for mimo-ofdm with limited feedback," *IEEE Trans. Signal Process.*, vol. 53, no. 11, pp. 4125–4135, Nov. 2005.
- [39] M. M. Fareed and M. Uysal, "Ber-optimized power allocation for fading relay channels," *IEEE Trans. Wireless Commun.*, vol. 7, no. 6, pp. 2350–2359, Jun. 2008.
- [40] M. Kobayashi and X. Mestre, "Impact of csi on distributed space-time coding in wireless relay networks," *IEEE Trans. Wireless Commun.*, vol. 8, no. 5, pp. 2580–2591, May 2009.
- [41] R. Annavajjala, P. C. Cosman, and L. B. Milstein, "Statistical channel knowledge-based optimum power allocation for relaying protocols in the high snr regime," *IEEE J. Sel. Areas Commun.*, vol. 25, no. 2, pp. 292–305, Feb. 2007.
- [42] B. Maham and A. Hjørungnes, "Power allocation strategies for distributed space-time codes in amplify-and-forward mode."
- [43] Y. Jing and H. Jafarkhani, "Network beamforming with channel means and covariances at relays," in *Proc. IEEE International Conf. on Communications (ICC'08)*, Beijing, May 2008, pp. 3743–3747.

- [44] —, “Network beamforming using relays with perfect channel information,” *IEEE Trans. Inf. Theory*, vol. 55, no. 6, pp. 2499–2517, Jun. 2009.
- [45] Z. Ding, W. H. Chin, and K. K. Leung, “Distributed beamforming and power allocation for cooperative networks,” *IEEE Trans. Wireless Commun.*, vol. 7, no. 5, pp. 1817–1822, May 2008.
- [46] G. Zheng, K. K. Wong, A. Paulraj, and B. Ottersten, “Collaborative-relay beamforming with perfect csi: Optimum and distributed implementation,” *IEEE Signal Process. Lett.*, vol. 16, no. 4, pp. 257–260, Apr. 2009.
- [47] V. Havary-Nassab, S. Shahbazpanahi, and A. Grami, “Optimal distributed beamforming for two-way relay networks,” accepted for publication on IEEE Trans. Signal Process.
- [48] K. T. Phan, T. Le-Ngoc, S. A. Vorobyov, and C. Tellambura, “Power allocation in wireless multi-user relay networks,” *IEEE Trans. Wireless Commun.*, vol. 8, no. 5, pp. 2535–2545, May 2009.
- [49] Y. Fan, A. Adinoyi, J. S. Thompson, H. Yanikomeroglu, and H. V. Poor, “A simple distributed antenna processing scheme for cooperative diversity,” *IEEE Trans. Commun.*, vol. 57, no. 3, pp. 626–629, Mar. 2009.
- [50] X. Tang and Y. Hua, “Optimal design of non-regenerative mimo wireless relays,” *IEEE Trans. Wireless Commun.*, vol. 6, no. 4, pp. 1398–1407, Apr. 2007.
- [51] J. Luo, R. S. Blum, L. Cimini, L. Greenstein, and A. Haimovich, “Power allocation in a transmit diversity system with mean channel gain information,” *IEEE Commun. Lett.*, vol. 9, no. 7, pp. 616–618, Jul. 2005.
- [52] Z. Chen, H. Liu, and W. Wang, “Optimal transmit strategy of a two-hop decode-and-forward mimo relay system with mean and covariance feedback,” *IEEE Commun. Lett.*, vol. 14, no. 6, Jun. 2010.

- [53] V. Havary-Nassab, S. Shahbazpanahi, A. Grami, and Z. Q. Lu, "Power allocation in a transmit diversity system with mean channel gain information," *IEEE Trans. Signal Process.*, vol. 56, no. 9, pp. 4306–4316, Sep. 2008.
- [54] E. Koyuncu, Y. Jing, and H. Jafarkhani, "Distributed beamforming in wireless relay networks with quantized feedback," *IEEE J. Sel. Areas Commun.*, vol. 26, no. 8, pp. 1429–1439, Oct. 2008.
- [55] A. G. Marques, X. Wang, and G. B. Giannakis, "Minimizing transmit power for coherent communications in wireless sensor networks with finite-rate feedback," *IEEE Trans. Signal Process.*, vol. 56, no. 9, pp. 4446–4457, Sep. 2008.
- [56] B. Khoshnevis, W. Yu, and R. Adve, "Grassmannian beamforming for mimo amplify-and-forward relaying," *IEEE J. Sel. Areas Commun.*, vol. 26, no. 8, pp. 1397–1407, Oct. 2008.
- [57] H. Hammerstrom and A. Wittneben, "Power allocation schemes for amplify-and-forward mimo-ofdm relay links," *IEEE Trans. Wireless Commun.*, vol. 6, no. 8, pp. 2798–2802, Aug. 2007.
- [58] S. H. Song and Q. T. Zhang, "Design collaborative systems with multiple af-relays for asynchronous frequency-selective fading channels," *IEEE Trans. Commun.*, vol. 57, no. 9, pp. 2808–2817, Sep. 2009.
- [59] H. Chen, A. Gershman, and S. Shahbazpanahi, "Filter-and-forward distributed beamforming in relay networks with frequency selective fading," accepted for publication on *IEEE Trans. Signal Process.*
- [60] I. Hammerstrom and A. Wittneben, "Power allocation schemes for amplify-and-forward MIMO-OFDM relay links," *IEEE Trans. Wireless Commun.*, vol. 6, no. 8, pp. 2798–2802, Aug. 2007.
- [61] Y. wen Liang and R. Schober, "Cooperative amplify-and-forward beamforming for ofdm systems with multiple relays," in *Proc. International Conference on Communications (ICC)2009*, Jun. 2009, pp. 1–6.

- [62] L. Vandendorpe, R. T. Duran, J. Louveaux, and A. Zaidi, "Power allocation for ofdm transmission with df relaying," in *Proc. International Conference on Communications (ICC)2008*, May 2008, pp. 3795–3800.
- [63] G. Jongren, M. Skoglund, B. Ottersten, and W. Y. Kuo, "Combining beamforming and orthogonal spacetime block coding," *IEEE Trans. Inf. Theory*, vol. 48, no. 3, pp. 611–6277, Mar. 2002.
- [64] M. Vu and A. Paulraj, "Optimal linear precoders for MIMO wireless correlated channels with nonzero mean in space-time coded systems," *IEEE Trans. Signal Process.*, vol. 54, no. 6, pp. 2318–2332, Jun. 2006.
- [65] H. B'olcskei, M. Borgmann, and A. J. Paulraj, "Impact of the propagation environment on the performance of space-frequency coded mimo-ofdm," *IEEE J. Sel. Areas Commun.*, vol. 21, no. 3, pp. 427–439, Apr. 2003.
- [66] L. J. Greenstein, S. S. Ghassemzadeh, V. Erceg, and D. G. Michelson, "Ricean k-factors in narrow-band fixed wireless channels: Theory, experiments, and statistical models," *IEEE Trans. Veh. Technol.*, vol. 58, no. 8, pp. 4000–4012, Oct. 2009.
- [67] G. Senarath *et al.*, "Multi-hop relay system evaluation methodology (channel model and performance metric)," *IEEE 802.16j-06/013r3*, Feb. 2007.
- [68] Y. Jing and H. Jafarkhani, "Network beamforming using relays with perfect channel information," *IEEE Trans. Inf. Theory*, vol. 55, no. 6, Jun. 2009.
- [69] ———, "Network beamforming with channel means and covariances at relays," in *Proc. IEEE International Conference on Communications (ICC'2008)*.
- [70] V. Havary-Nassab, S. Shahbazpanahi, A. Grami, and Z.-Q. Luo, "Distributed beamforming for relay networks based on second-order statistics of the channel state information," *IEEE Trans. Inf. Theory*, vol. 56, no. 9, Sep. 2008.

- [71] M. Kobayashi and X. Mestre, "Impact of CSI on distributed space-time coding in wireless relay networks," *IEEE Trans. Wireless Commun.*, vol. 8, no. 5, May 2009.
- [72] H. Sampath and A. Paulraj, "Linear precoding for space-time coded systems with known fading correlations," *IEEE Commun. Lett.*, vol. 6, no. 6, Jun. 2002.
- [73] A. Y. F. Adinoyi, J. Thompson, H. Yanikomeroglu, and H. Poor, "A simple distributed antenna processing scheme for cooperative diversity," *IEEE Trans. Commun.*, vol. 57, no. 3, Mar. 2009.
- [74] M. Grant and S. Boyd. (2011, Apr.) CVX: matlab software for disciplined convex programming. Version 1.21. [Online]. Available: <http://cvxr.com/cvx/>
- [75] R. U. Nabar, H. Bolcskei, and F. W. Kneubuhler, "Fading relay channels: Performance limits and space-time signal design," *IEEE J. Sel. Areas Commun.*, vol. 22, no. 6, pp. 1099–1109, Aug. 2004.
- [76] *Universal Mobile Telecommunications System (UMTS); Spacial channel model for Multiple Input Multiple Output (MIMO) simulations*, ETSI Std., 3GPP TR 25.996 version 9.0.0 Release 9.
- [77] A. Goldsmith, *Wireless Communications*. Cambridge University Press, 2005.
- [78] V. Tarokh, N. Seshadri, and A. R. Calderbank, "Space-time codes for high data rate wireless communication: Performance criterion and code construction," *IEEE Trans. Inf. Theory*, vol. 44, no. 2, pp. 744–765, Mar. 1998.
- [79] N. D. Suraweera and K. C. B. Wavegedara, "Transmit beamforming techniques for space-frequency coded MIMO-OFDM systems in a correlated rician fading channel," in *Proc. International Conference on Communications and Information Technology (ICCIT)2011*, Mar. 2011, pp. 65–69.

- [80] P. P. Soma, D. S. Baum, V. Erceg, R. Krishnamoorthy, and A. Paulraj, "Analysis and modeling of multiple-input multiple-output (MIMO) radio channel based on outdoor measurements conducted at 2.5 ghz for fixed bwa applications," in *Proc. IEEE International Conference on Communications (ICC'02)*, Apr. 2002, pp. 272–276.

