

## PUBLICATIONS, PROJECTS, & TALKS

### Theses

1. T. Y. Al-Naffouri, "Adaptive algorithms for wireless channel estimation," Department of Electrical Engineering, Stanford University, Jan. 2005.
2. T. Y. Al-Naffouri, "Adaptive filtering using the least-mean mixed-norms algorithm and its application to echo cancellation," Department of Electrical Engineering, King Fahd University, Jul. 1997.

### Book Chapters

1. T. Y. Al-Naffouri, M. Saqib, and A. Quadeer "Iterative forward-backward Kalman filtering for data recovery in (multiuser) OFDM communications," *Applications of Kalman Filters*, I-Tech Education and Publishing, Nov. 2008.
2. A. H. Sayed, T. Y. Al-Naffouri, and Vitor H. Nascimento "Energy conservation in adaptive filtering," *Nonlinear Signal and Image processing: Theory, Methods, and Applications*, CRC Press, 2003.

### Journal Publications

1. T. Y. Al-Naffouri, Weiyu Xu, A. Quadeer, and B. Hassibi, "Low complexity blind data recovery in OFDM," *under preparation for submission to IEEE Transactions on Signal Processing*
2. Giuseppe Caire and T. Y. Al-Naffouri, "Impulse noise cancellation in OFDM: An application of compressed sensing," *under preparation for submission to IEEE Transactions on Communications*
3. T. Y. Al-Naffouri and B. Hassibi, "On the distribution of indefinite Hermitian quadratic forms in Gaussian random variables," *under preparation for submission to IEEE Transactions on Information Theory*
4. T. Y. Al-Naffouri, M. Moinuddin, and B. Hassibi, "Exact mean-square analysis of the ( $\epsilon$ -) normalized LMS," *under preparation for submission to IEEE Transactions on Signal Processing*.
5. T. Y. Al-Naffouri, S. Lu, and N. Al-Dhahir, "A parameter reduction approach to channel estimation in OFDM transmission with ICI" *under preparation for submission to IEEE Transactions on Signal Processing*.
6. T. Y. Al-Naffouri "Opportunistic beamforming with MMSE precoding for spatially correlated channels," *submitted to IEEE Transactions on Wireless Communications*.
7. T. Y. Al-Naffouri, "Scaling laws of the minimum of i.i.d. random variables" *submitted to IEEE Signal Processing Letters*.
8. T. Y. Al-Naffouri and M. Sqib Sohail "An EM based frequency domain channel estimation algorithm for multi-access OFDM systems," *submitted to Elsevier Signal Processing*.
9. T. Y. Al-Naffouri and A. Quadeer "Blind maximum-likelihood channel and data recovery in OFDM," *submitted to IEEE Transactions on Signal Processing*.
10. A. Zerguine, M. K. Chan, T. Y. Al-Naffouri, and M. Moinuddin "Convergence and tracking analysis of a variable normalised LMF (XE-NLMF) algorithm," *submitted to Elsevier Signal Processing*.
11. T. Y. Al-Naffouri and A. Quadeer "Receiver design for OFDM MIMO transmission over time variant channels," *submitted to EURASIP Journal on Applied Signal Processing*.

12. T. Y. Al-Naffouri, A. Dana, and B. Hassibi, "Scaling laws of group broadcast channels" *to appear in IEEE Transactions on Wireless Communications*.
13. T. Y. Al-Naffouri, M. Sharif, and B. Hassibi "How much does transmit correlation affect the sum-rate of MIMO downlink channels?" *to appear in IEEE Transactions on Communications*.
14. T. Y. Al-Naffouri, "An EM-based forward-backward Kalman filter for the estimation of time-variant channels in OFDM," *IEEE Transactions on Signal Processing*, vol. 55, Jul. 2007.
15. G. Alrawi, T. Y. Al-Naffouri, A. Bahai, and J. Cioffi, "Exploiting error-control coding and cyclic prefix in channel estimation for coded OFDM systems," *IEEE Communications Letters*, vol. 7, no. 8, Aug. 2003, pp. 388-390.
16. T. Y. Al-Naffouri and A. H. Sayed, "Transient analysis of adaptive filters with error nonlinearities," *IEEE Transactions on Signal Processing*, vol. 51, No. 3, pp. 653-663, Mar. 2003.
17. T. Y. Al-Naffouri and A. H. Sayed, "Transient analysis of data-normalized adaptive filters," *IEEE Transactions on Signal Processing*, vol. 51, No. 3, pp. 639-652, Mar. 2003.
18. T. Y. Al-Naffouri and A. H. Sayed, "Adaptive filters with error nonlinearities: Mean-square analysis and optimum design," *EURASIP Journal on Applied Signal Processing*, Special issue on nonlinear signal processing and applications, vol. 2001, no. 4.

#### **Patent**

1. G. Alrawi, A. Bahai, T. Y. Al-Naffouri, and J. Cioffi, *Coded OFDM system using error control coding and cyclic prefix for channel estimation*, US patent pending.

#### **Conference Publications**

1. A. Quadeer, T. Y. Al-Naffouri, and M. Shadaydeh "(Semi-) Blind maximum-likelihood data recovery in OFDM," *EUSIPCO*, Lausanne, Switzerland, Aug. 2008.
2. G. Caire, T. Y. Al-Naffouri, and A. Narayanan "Impulse noise cancellation in OFDM: an application of compressed sensing," *International Symposium on Information Theory*, Toronto, Canada, Jul. 2008.
3. T. Y. Al-Naffouri and A. Quadeer "Blind maximum-likelihood channel and data recovery in OFDM," *ICASSP*, Las Vegas, NV, Apr. 2008.
4. T. Y. Al-Naffouri and A. Mukaddam "Frequency Domain Estimation of Multiple Access OFDM" *IEEE International Conference on Signal Processing and Communication*, Dubai, UAE, Nov. 2007.
5. T. Y. Al-Naffouri, "Receiver Design for MIMO OFDM Transmission over Time Variant Channels," *8th IEEE Workshop on Signal Processing Advances for Wireless Communications*, Helsinki, Finland, Jun. 2007.
6. A. Dana, T. Y. Al-Naffouri, and Babak Hassibi, "On the Capacity scalings of the Multiple Antenna Group-Broadcast," *International Symposium on Information Theory*, Nice, France, Jun. 2007.
7. T. Y. Al-Naffouri, Amir Dana, and Babak Hassibi, "Scaling Laws of Multiple Antenna Group-Broadcast Channels," *International Workshop on Wireless Networks: Communication, Cooperation and Competition*, Limasol, Cyprus, Apr. 2007.
8. T. Y. Al-Naffouri, M. Sharif, and B. Hassibi "How much does transmit correlation affect the sum-rate of MIMO downlink channels?" *International Symposium on Information Theory*, Seattle, OR, Jul. 2006.

9. T. Y. Al-Naffouri, "Blurring the academic boundaries: Producing sustainable competitive advantage," *4th International Forum of Engineering Education IFEE 2006*, Sharjah, UAE, Apr. 2006.
10. T. Y. Al-Naffouri and A. Paulraj, "A forward-backward Kalman for the estimation of time-variant channels in OFDM," *6th IEEE Workshop on Signal Processing Advances for Wireless Communications*, New York, NY, Jun. 2005.
11. T. Y. Al-Naffouri, O. Oteri, O. Awoniyi, and A. Paulraj, "Receiver design for MIMO-OFDM transmission over time variant channels," *GLOBECOM 2004*, Dallas, Texas, Nov. 2004.
12. O. Oteri, T. Y. Al-Naffouri, O. Awoniyi, and A. Paulraj, "Joint channel/data recovery in STBC MIMO-OFDM," *Wireless Networking Symposium*, Austin, Texas, Oct. 2003.
13. G. Alrawi, T. Y. Al-Naffouri, A. Bahai, and J. Cioffi, "An Iterative receiver for coded OFDM systems over time-varying wireless channels," *ICC 2003*.
14. T. Y. Al-Naffouri, A. Bahai, and A. Paulraj, "An EM-based OFDM receiver for time-variant channels," *GLOBECOM 2002*, Taipei, Taiwan, Nov. 2002.
15. G. Alrawi, T. Y. Al-Naffouri, A. Bahai, and J. Cioffi, "Exploiting error-control coding and cyclic prefix in channel estimation for coded OFDM systems," *GLOBECOM 2002*, Taipei, Taiwan, Nov. 2002.
16. T. Y. Al-Naffouri, A. Bahai, and A. Paulraj, "Semi-blind channel identification and equalization in OFDM: An expectation-maximization approach," *VTC 2002*, Vancouver, Canada, Sep. 2002.
17. T. Y. Al-Naffouri and A. H. Sayed, "Optimum error nonlinearities for long adaptive filters," *ICASSP*, Orlando, FL, May 2002.
18. T. Y. Al-Naffouri, G. Alrawi, A. Bahai, and A. Paulraj, "Least/mean squares channel identification and equalization in OFDM transmission," *ICASSP*, Vol.3, pp. 2577 -2580, May 2002 .
19. T. Y. Al-Naffouri, D. Toumpakaris, A. Bahai, and A. Paulraj, "An adaptive semi-blind algorithm for channel identification in OFDM," *Asilomar Conference on Signals, Systems, and Computers*, Nov. 2001.
20. T. Y. Al-Naffouri and A. H. Sayed, "Mean-square analysis of adaptive filters– Part I: The data nonlinearity case," *2001 IEEE-EURASIP Workshop on Nonlinear Signal and Image Processing*, Jun. 2001.
21. A. H. Sayed and T. Y. Al-Naffouri, "Mean-square analysis of normalized leaky adaptive filters," *ICASSP*, Salt Lake City, Utah, May 2001.
22. T. Y. Al-Naffouri and A. H. Sayed, "Transient analysis of adaptive filters," *ICASSP*, Salt Lake City, Utah, May 2001.
23. T. Y. Al-Naffouri and A. H. Sayed, "Mean-square analysis of adaptive filters– Part II: The error nonlinearity case," *2001 IEEE-EURASIP Workshop on Nonlinear Signal and Image Processing*, Jun. 2001.
24. T. Y. Al-Naffouri and A. H. Sayed, "An adaptive filter robust to data uncertainties," *Allerton Conference on Communication, Control, and Computing*, Allerton, IL, Oct. 2000.
25. T. Y. Al-Naffouri, A. Zerguine, and M. Bettayeb, "The optimum error nonlinearity in LMS adaptation with an independent and identically distributed input," *X EUSIPCO*, Tampere, Finland, Sep. 2000.
26. T. Y. Al-Naffouri, A. H. Sayed, and T. Kailath, "On the selection of optimal nonlinearities for stochastic gradient adaptive algorithms," *ICASSP*, vol. 1, pp. 464-467, Istanbul, Turkey, Jun. 2000.
27. A. H. Sayed, T. Y. Al-Naffouri, and T. Kailath, "Robust estimation for uncertain models in a data fusion scenario," *IFAC System Identification Symposium*, Santa Barbara, CA, Jun. 2000.

28. T. Y. Al-Naffouri, A. Zerguine, and M. Bettayeb, "Convergence properties of mixed-norm algorithms under general error criteria," *ISCAS*, Orlando, Florida, May 1999.
29. T. Y. Al-Naffouri, A. Zerguine, and M. Bettayeb, "Convergence analysis of the LMS algorithm with a general error nonlinearity and i.i.d input," *Asilomar Conference on Signals, Systems, and Computers*, vol. 3, pp. 211-214, Nov. 1998.
30. T. Y. Al-Naffouri, A. Zerguine, and M. Bettayeb, "A unifying view of error nonlinearities in LMS adaptation," *ICASSP*, vol. 3, pp. 1697 -1700, Seattle, May 1998.

### **Standard Proposals**

1. Erik Lidskog et. al., "Enhancement to space-time codes for 3 transmit antennas for the OFDMA PHY," Seoul, South Korea, Aug. 2004 (*accepted and incorporated into the IEEE 802.16e Standard*)
2. Erik Lidskog et. al., "Enhancements of the 4 transmit antenna rate 1 space-time code for the OFDMA PHY," Seoul, South Korea, Aug. 2004.
3. Erik Lidskog et. al., "Enhancements to 4 transmit antenna rate 2 space-time codes for the OFDMA PHY," Seoul, South Korea, Aug. 2004.
4. Erik Lidskog et. al., "Modified pilot allocation for downlink STC PUSC," Seoul, South Korea, Aug. 2004.
5. Erik Lidskog et. al., "Fast link adaptation feedback," Seoul, Korea, Aug. 2004.
6. Erik Lidskog et. al., "Modification to open-loop MIMO precoding," Seoul, South Korea, Aug. 2004.
7. Erik Lidskog et. al., "Modified pilot allocation for AMC and optional PUSC uplink subchannels for STC mode," Portland, OR, Jul. 2004.
8. Erik Lidskog et. al., "Enhancements of space-time codes for the OFDMA PHY," Portland, OR, Jul. 2004.
9. Erik Lidskog et. al., "Space-time codes for 3 transmit antennas for the OFDMA PHY," Portland, OR, Jul. 2004. (*accepted and incorporated into the IEEE 802.16e Standard*)

### **Projects**

1. "Free Deconvolution for Seismic Applications," Jointly Funded Project by *Ecole Suprieure d'Electricit (Suplec)*, Paris, France and *King Fahd University of Petroleum and Minerals*, Jun. 2008-Dec. 2008. (Co-Investigator)
2. "Design of Fast Recursive Least Squares Filters for Wireless Communications," Jointly Funded Project by *Helsinki University of Technology (TKK)*, Helsinki, Finland, and *King Fahd University of Petroleum and Minerals*, Nov. 2008-Nov. 2009. (Co-Investigator)
3. "Estimation of Time-Variant Channels and ICI Cancellation in OFDM" *King AbdulAziz City of Science and Technology*, Dec. 2007-Dec. 2009. (Principal Investigator)
4. "Broadcasting Data to Multiple User Groups: Information Theoretic Investigation of the Wide Band Case," University Project, *King Fahd University of Petroleum and Minerals*, Jun. 2007- Feb. 2009. (Principal Investigator)
5. "The Effect of Spatial Correlation on the Capacity of Multi-Input Multi-Output Broadcast Channels with Partial Side Information," University Project, *King Fahd University of Petroleum and Minerals*, Mar. 2007-Jun. 2008. (Principal Investigator)

6. "The Near-Surface Seismic Investigation Consortium" *A Consortium Funded by Saudi Aramco and Schlumberger*, Jan. 2007-Jan. 2008. (Co-investigator)
7. "Frequency Domain Estimation of Time Variant Channels in OFDM" Junior Faculty Project, *King Fahd University of Petroleum and Minerals*, Sep. 2006-Aug. 2007. (Principal Investigator)
8. "Enhancing Student Participation in Extra Curricular Activities and Interaction with the Faculty," *A Project of KFUPM's Strategic Plan*, Mar. 2007-Jun. 2008. (Co-investigator)
9. "Establishing Entrepreneurial and Value-added Programs," *A Project of KFUPM's Strategic Plan*, Mar. 2006-Jun. 2007. (Co-investigator)
10. "Online Development of the Undergraduate Communication Engineering Course," *Deanship of Academic Development, King Fahd University of Petroleum and Minerals*, May 2006-Jun. 2007. (Co-investigator)

### Talks

1. "Scaling laws of multiple antenna (group) broadcast channels," *Electrical Engineering Department, University of California at Irvine, CA*, Jun. 18, 2008.
2. "Scaling laws of multiple antenna (group) broadcast channels," *Electrical Engineering Department, University of Southern California, CA*, Feb. 20, 2008.
3. "(Semi) blind channel identification and equalization in OFDM," *Babak Hassibi's Research Group, Electrical Engineering Department, California Institute of Technology, Pasadena, CA*, Feb. 15, 2008.
4. "Scaling laws of multiple antenna group-broadcast channels," *Ecole Supérieure d'Electricité (Supélec), Paris, France*, Jul. 6, 2007.
5. "How much does correlation affect the sum-rate of MIMO downlink channels?" *Institute Eurcom, Sophia-Antipolis, France*, June 21, 2007.
6. "The potential of adaptive filtering for seismic signal processing," *Research Institute, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia*, May 15, 2007.
7. "Broadcasting data to multiple user groups: Information theoretic investigation of the wide band case," *Electrical Engineering Department, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia*, May 1st, 2007.
8. "Opportunistic scheduling in wireless networks: An overview of issues and design considerations," (jointly with Dr. Yahya Al-Harhi (KFUPM) and Dr. Mohamed-Slim Alouini (Texas A & M Qatar), Tutorial at the *International Symposium on Signal Processing and its Applications (ISSPA 2007)*, Sharjah, UAE, Feb 11, 2007.
9. "Employing undergraduates as teaching assistants at KFUPM," *Deanship of Academic Development, Center of Teaching and Learning, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia*, Jan. 16, 2007.
10. "The effect of spatial correlation on the capacity of MIMO broadcast channels with partial side information," *Electrical Engineering Department, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia*, Jan. 13, 2007.
11. "How much does correlation affect the sum-rate of MIMO downlink channels?" *Electrical Engineering Department, Imperial College, London, UK*, Nov. 23, 2006.

12. "A unified approach to mean-square analysis of adaptive filters," *Electrical Engineering Department, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia, Nov. 20, 2006.*
13. "How much does correlation affect the sum-rate of MIMO downlink channels?" *Research Department, Intel Corporation, Santa Clara, CA, Aug. 22, 2006.*
14. "Broadcasting data to multiple user groups: An information theoretic investigation," *Babak Hassibi's Research Group, Electrical Engineering Department, California Institute of Technology, Pasadena, CA, Jul. 29, 2006.*
15. "A framework for the estimation of time-variant channels in OFDM," *Delft Technical University, Delft, the Netherlands, Jun. 9th, 2006.*
16. "A forward backward Kalman for the estimation of time-variant channels in OFDM" *Electrical Engineering Department, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia, Nov. 16, 2005.*
17. "A framework for the estimation of time-variant channels in OFDM," *the University of New Louvain, Belgium, Nov. 2nd, 2005.*
18. "A unified approach to mean-square analysis of adaptive filters," *the University of New Louvain, Belgium, Nov. 2nd, 2005.*
19. "A framework for the estimation of time-variant channels in OFDM," *Telecommunications Research Center, Vienna, Austria, Oct. 28, 2005.*
20. "Wireless broadband networks–WIMAX: A contrast and a complement to WiFi," (jointly with Dr. Salam Zummo) *Internet and Communications Engineering Technical Exchange Meeting (e-CETEM), Saudi Aramco, Dhahran, Saudi Arabia, Sep. 19, 2005.*
21. "A unified approach for transient analysis of adaptive filters," *Babak Hassibi's Research Group, Electrical Engineering Department, California Institute of Technology, Pasadena, Mar. 25th, 2005.*
22. "Receiver design for MIMO-OFDM transmission over time-variant frequency selective channels," *Standards Group, Qualcomm Corporation, San Diego, Jun. 18th, 2004.*
23. "Receiver design for MIMO-OFDM transmission over time-variant frequency selective channels" *Communications Systems Lab., Texas Instruments, Dallas, TX, Feb. 23, 2004.*
24. "Adaptive semi-blind receiver for MIMO-OFDM transmission," *ATHEROS Communications, Sunnyvale, CA, Dec. 23, 2003.*
25. "Receiver design for MIMO OFDM transmission over time-variant channels," *TZero Technologies Inc., Sunnyvale, CA, Jan. 27, 2004.*
26. "An OFDM receiver for MIMO OFDM transmission over wireless channels," *Intel Corporation, Sunnyvale, CA, Dec. 19, 2003.*
27. "A semi-blind algorithm for OFDM transmission over wireless channels" *Stanford Networking Research Group, Stanford University, Apr. 10, 2003.*
28. "Adaptive algorithms for wireless channel estimation" *Qualcomm Technology Ventures, Qualcomm Corporation, San Diego, Apr. 3, 2003.*