

# EXHIBIT A

ELECTRICAL ENGINEERING DEPARTMENT • UNIVERSITY OF CALIFORNIA, LOS ANGELES  
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# RICHARD DALE WESEL

## EDUCATION

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1991 – 1996 **Stanford University**, Stanford, CA

*Ph.D. in Electrical Engineering*

Dissertation: *Trellis Code Design for Correlated Fading and Achievable Rates for Tomlinson-Harashima Precoding.*

1984 – 1989 **Massachusetts Institute of Tech.**, Cambridge, MA

*S. M. and S. B. in Electrical Engineering*

Dissertation: *Adaptive Equalization for Modem Constellation Identification.*

## EMPLOYMENT

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1996 – present **University of California, Los Angeles**, Los Angeles, CA

*Associate Dean of Academic and Student Affairs for the Henry Samueli School of Engineering and Applied Science since July 2007*

*Professor of Electrical Engineering since July 2006*

*Associate Professor of Electrical Engineering 2002-2006*

*Assistant Professor of Electrical Engineering 1996-2001*

1992-present **Various Firms**, CA

*Consultant to various firms including Xerox PARC, Elantec, Metricom, Townsend and Townsend and Crew, Clarity Wireless (now part of Cisco), Kyocera Wireless Corporation, Latham & Watkins, Aktino Corporation, Fulbright & Jaworski, McAndrews, Held, & Malloy, Weil Gotshcal & Manges, Kirkland & Ellis, Townsend and Townsend and Crew, Kilpatrick Townsend & Stockton.*

1991 – 1996 **Stanford University**, Stanford, CA

*Research Assistant and Teaching Assistant.*

1989 – 1991 **AT&T Bell Laboratories**, Holmdel, NJ

*Member of Technical Staff. 1989-1991. Also at AT&T as MTS during summer 1994 and an intern 1986-1989.*

## TEACHING RESPONSIBILITIES

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Courses taught: EE131A Probability, EE132A Communications Systems, EE231A Information Theory, EE232A Stochastic Processes, and EE231E Channel Coding

**Winner 2000 TRW Excellence in Teaching Award**

## AWARDS

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- Selected for the National Academy of Engineering Frontiers of Engineering Program
- TRW Excellence in Teaching Award (UCLA School of Engineering)
- Okawa Foundation Award for Excellence in Telecomm. Research
- National Science Foundation CAREER Award
- AT&T Foundation Ph.D. Fellow.
- IEEE Senior Member, Tau Beta Pi MIT chapter president 1987-1988, Eta Kappa Nu, Sigma Xi, National Merit Scholar.

## GRADUATED PH.D. STUDENTS

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1. Christina Fragouli, Ph.D. Sept. 2000, Dissertation: *Turbo Code Design for High Spectral Efficiency*, 2000-2001 UCLA EE Dept. **Ph.D. Student of the Year Award**. FNS Assistant Professor at EPFL.
2. Christos Komninakis, Ph.D. Dec. 2000, Dissertation: *Joint Channel Estimation and Decoding for Wireless Channels*, AWR Corp., El Segundo, CA.
3. Xueting Liu, Ph.D. Dec. 2000, Dissertation: *Trellis Code Design for Periodic Erasures and Adaptive Coded, Modulation Schemes for Time-Varying Channels*, Nokia, San Diego, CA.
4. Wei Shi, Ph.D. Dec. 2000, Dissertation: *New Results in Wireless Communications*, Qualcomm, San Diego, CA.
5. Tom Sun, Ph.D. Dec. 2002, Dissertation: *Error Protection Techniques for Source and Channel Coding*, Qualcomm, San Diego, CA.
6. Chris Jones, Ph.D. Dec. 2003, Dissertation: *Constructions, applications, and implementations of low-density parity-check codes*, Jet Propulsion Laboratory, Pasadena, CA
7. Adina Matache, Ph. D. June 2004, Dissertation: *Coding Techniques for High Data Rates in Wireless Multiple-Input Multiple-Output Communications*, Marvell, San Jose, CA
8. Cenk Kose, Ph.D. Dec. 2004, Dissertation: *Universal trellis codes and concatenated trellis-coded modulations for the compound linear vector Gaussian channel*, Conexant, San Diego, CA
9. Aditya Ramamoorthy, June 2005, *Generalized ACE Codes and Theoretic Results in Network Coding*, Assistant Professor at Iowa State University starting Fall 2006
10. Jun Shi, Ph.D. Sept. 2005, Dissertation: *Universal Channel Codes and Trellis State-Diagram Reduction*

11. Wen-Yen Weng, Ph.D. March 2007, Dissertation: *Universal Serially Concatenated Trellis Coded Modulations and Rate-Compatible High-Rate LDPC Codes*
12. Esteban Valles (Primary Advisor John Villasenor), Ph.D. March 2007, Dissertation: *Timing Recovery Using Soft Information Feedback and Efficiency of Array Codes*
13. Andres Vila Casado, Ph.D. December 2007, Dissertation: *Improving LDPC Decoders: Informed Dynamic Message-Passing Scheduling and Multiple-Rate Code Design*
14. Herwin Chan (Primary Advisor Ingrid Verbauwhede), Ph.D. December 2007, Dissertation: *Accelerating Applications Through Cross-Layer Co-Design*
15. Miguel Griot, Ph.D. Sept. 2008, Dissertation: *Nonlinear Codes for Multiple Access to Binary Channels and Higher-Order Modulations over the AWGN Channel*
16. Bike Xie, Ph.D. June 2010, Dissertation: *Encoding for Degraded Broadcast Channels and Resource Allocation for content Distribution in Peer-To-Peer Networks*

## PROFESSIONAL ACTIVITIES

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- **Associate Editor**, *IEEE Transactions on Communications* 1999-2005.
- **Technical Program Committee Member**, regularly for *Globecom* and *ICC*.
- **Technical Program Chair**, *Communication Theory Symposium at Globecom 2002*.
- **Organizer and Session Chair** for Special Session on Concatenated codes and iterative decoding at the *2001 Asilomar Conf. on Signals, Systems, and Computers*.
- **Organizer and Session Chair** for Special Session on Communication over Time Varying Channels at the *1999 Asilomar Conf. on Signals, Systems, and Computers*.
- **Session Organizer and Chair** for Communication Theory Symposium at the 2001 International Conference on Communications.
- **Panel member** for three National Science Foundation Proposal Review Panels.
- **Organizer and lecturer** for UCLA Extension course on Error Control Coding (annually since 2000). Received an award for being among the top 10% of UCLA extension lecturers.
- **Instructor** for 1997 UCLA Extension course on wireless multimedia communications.
- **Invited speaker** 1998 and 2000 *IEEE Communication Theory Workshops*.
- **Invited speaker** Office of Naval Research, Naval Research Labs 1998 Turbo Codes Workshop.
- **Invited speaker** 1998 DARPA GloMo workshop on emerging technologies for hand-held wireless devices in military communication.
- **Invited speaker** at various universities and companies including Stanford, Berkeley, U.C. San Diego, the Ohio State University, University of Arizona, the Johns Hopkins University, Cornell, Telia Research, Lulea, Sweden, Lucent, Boeing, Xetron, Texas Instruments, Conexant, and Microsoft Research.
- **Reviewer** for various IEEE conferences and journals. Regularly reviewing submissions to *Trans. on Information Theory*, *Trans. On Communications*, *Journal on Selected Areas of Communications*, *Communications Letters*, *Globecom*, and *International Conference on Communications*, 1994-present.

## ACADEMIC SERVICE

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- **Member of the Executive Enrollment Management Group**  
October 2011-present
- **Member of the Undergraduate Non-Resident Implementation Task Force**  
August 2010 – July 2011
- **Member of UCLA Undergraduate Council** July 2006- July 2008.
- **Member of the Committee on Undergraduate Admissions and Relations with Schools** July 2006- July 2008
- **Electrical Engineering Department Vice Chair for Undergraduate Affairs** July 2005 – July 2007. Successfully managed the 2006 ABET Accreditation visit.
- **Member of the School of Engineering Faculty Executive Committee** 2003-2006.
- **Chair of the Electrical Engineering Department Courses and Curriculum Committee** 2003-2005.
- **Chair of the Communications Major Field** in the Electrical Engineering Department at the University of California, Los Angeles, 1999-2004.
- **Chair of the Cubicle Allocation Committee** for the Electrical Engineering Department at UCLA, managing the allocation of 150 student cubicles among approximately 20 professors who share this space, 1998-2005.
- **Chair of 2002 Annual Research Review** (annual departmental research symposium). Also Vice Chair of 2001 Annual Research Review.
- **Member of 2001 UCLA EE Annual Report Committee.**
- **Elected Member of the Legislative Assembly** of the UCLA Academic Senate, 1997-2001.
- **Chair for quarterly Seminar Series** in Signals and Systems. Established this seminar series in spring 1997. Recruit a professor each quarter to organize speakers for the series. Personally organized speakers for four of these quarters.
- **Local Exhibits Chair**, 1997 UCLA EE Research Symposium

## PUBLISHED/ACCEPTED JOURNAL PUBLICATIONS

1. M. Griot, A. I. Vila Casado, W.-Y. Weng, H. Chan and R. D. Wesel, "Nonlinear Trellis Codes for Binary-Input Binary-Output Multiple Access Channels With Single-User Decoding," Accepted in IEEE Transactions on Communications.
2. T. A. Courtade and R. D. Wesel, "Optimal Allocation of Redundancy Between Packet-Level Erasure Coding and Physical-Layer Channel Coding in Fading Channels," Transactions on Communications, Vol. 59, No. 8, pp. 2101-2109, August 2011.
3. A. I. Vila Casado, M. Griot, and R. D. Wesel, "LDPC Decoders with Informed Dynamic Scheduling," IEEE Transactions on Communications, Vol. 58, No. 12, pp 3470-3479, Decembber 2010

4. A. I. Vila Casado, W.-Y. Weng, S. Valle, and R. D. Wesel, " Multiple-Rate Low-Density Parity-Check Codes with Constant Blocklength ," *IEEE Transactions on Communications*, Vol. 57, No. 1, pp 75-83, January 2009.
5. H. Chan, A. I. Vila Casado, J. Basak, M. Griot, W.-Y. Weng, R. D. Wesel, B. Jalali, E. Yablonovitch, I. Verbaughede, " Demonstration of Uncoordinated Multiple Access in Optical Communications ," *IEEE Transactions on Circuits and Systems-I: Regular Papers*, Vol. 55, No. 10, pp 3259-3269, November 2008.
6. W.-Y. Weng, C. Kose, B. Xie and R. D. Wesel, " Universal Serially Concatenated Trellis Coded Modulation for Space-Time Channels ," *IEEE Transactions on Communications*, Vol. 56, No. 10, pp 1636-1646, October 2008.
7. B. Xie, M. Griot, A. I. Vila Casado, and R. D. Wesel, " Optimal Transmission Strategy and Explicit Capacity Region for Broadcast Z Channels ," *IEEE Transactions on Information Theory*, Vol. 53, No. 9, pp 4296-4304, September 2008.
8. J. Shi and R. D. Wesel, " A Study on Universal Codes with Finite Block Lengths," *IEEE Transactions on Information Theory*, Vol. 54, No. 9, pp 3066-3074, September 2007.
9. M. Griot, W.-Y. Weng and R. D. Wesel, " A Tighter Bhattacharyya Bound for Decoding Error Probability," *IEEE Communications Letters*, Vol.11, No. 4, pp 346-347, April 2007.
10. C. R. Jones, T. Tian, J. Villasenor and R. D. Wesel, " The Universal Operation of LDPC Codes Over Scalar Fading Channels," *IEEE Transactions on Communications*, Vol. 55, no. 1, pp 122-132, Jan. 2007
11. Kose C. and Wesel R. D., " Universal Space-Time Codes from Demultiplexed Trellis Codes," *IEEE Transactions on Communications*. Vol.54. No 7. July 2006.
12. F.Peng, W.Ryan. and R.D.Wesel," Surrogate-Channel Design of Universal LDPC Codes," *IEEE Communications Letters*, Jun. 2006, vol. 10, no. 6, pp 480-482
13. A. Ramamoorthy, J. Shi and R. D. Wesel, " On the Capacity of Network Coding for Random Networks," *IEEE Transactions on Information Theory*, Aug. 2005, Vol. 51, no. 8, pp 2878-2885
14. Wesel R. D., "Reduced-State Representations for Trellis Codes Using Constellation Symmetry," *IEEE Transactions on Communications*, Aug. 2004, vol. 52(8) pp 1302-1310
15. Tian T., Jones C., Villasenor J. D. and Wesel R. D., "Selective Avoidance of Cycles in Irregular LDPC Code Construction," *IEEE Transactions on Communications*, Aug. 2004, vol. 52(8), pp 1242-1247.
16. Sun T. W., Wesel R. D., Shane M. R. and Jarett K., "Superposition Turbo-TCM for Multi-Rate Broadcast," *IEEE Transactions on Communications*, Mar. 2004, vol. 52( 3), pp 368-371.
17. Shi J. and Wesel R. D., "Efficient Computation of Trellis Code Generating Functions," *IEEE Transactions on Communications*, Feb. 2004, vol. 52(2), pp 219-227.
18. Matache A. and Wesel R. D., "Universal Trellis Codes for Diagonally Layered Space-Time Systems," *IEEE Transactions on Signal Processing*, Nov. 2003, vol. 51(11) pp 2773-2783, Special Issue on "MIMO Wireless"
19. Kose C. and Wesel R. D., "Universal Space-Time Trellis Codes," *IEEE Trans. on Info. Theory*, Oct. 2003, vol. 40(10) pp 2717-2727 Special Issue on "Space-Time Transmission, Reception, Coding and Signal Design"
20. Q. Zhang, P. K. Varshney, and R. D. Wesel, "Optimal Bi-level quantization of I.I.D Sensor Observations for Binary Hypothesis Testing," *IEEE Trans. on Info Theory*, July 2002, 48(7) pp. 2105-2110.

21. C. Komninakis, C. Fragouli, A. H. Sayed, and R. D. Wesel, "Multi-Input, Multi-output Fading Channel Tracking and Equalization Using Kalman Estimation," *IEEE Transactions on Signal Processing*, May 2002, vol. 50(5), pp. 1065-1076.
22. A. Bernard, X. Liu, R. D. Wesel, and A. Alwan, "Multi-rate Transmission of Speech Using Rate-Compatible Trellis Codes and Embedded Source Codes," *IEEE Transactions on Communications*, February 2002, vol. 50(2) pp. 309-320.
23. P. Ormeci, D. L. Goeckel, X. Liu, and R. D. Wesel, "Adaptive Bit-Interleaved Coded Modulation for Time-Varying Channels Using Outdated Fading Estimates" *IEEE Transactions on Communications*, Sept. 2001, 49(9), pp. 1572-1581.
24. R. D. Wesel, X. Liu, J. M. Cioffi, and C. Komninakis, "Constellation Labeling for Linear Encoders," *IEEE Trans. on Info. Theory*, Sept. 2001, 47(6), pp. 2417-2431.
25. C. Komninakis and R.D. Wesel, "Joint Iterative Channel Estimation and Decoding in Flat Correlated Rayleigh Fading," *IEEE Journal on Sel. Areas in Comm.*, Sept. 2001, 19(9), pp. 1706-17.
26. C. Fragouli and R. D. Wesel, "Turbo encoder design for symbol interleaved parallel concatenated trellis coded modulation," *IEEE Trans. on Comm.*, 49(3), Mar. 2001, pp. 425-435.
27. W. Shi, T. W. Sun, and R. D. Wesel, "Quasi-convexity and Optimal Binary Fusion for Distributed Detection with Identical Sensors in Generalized Gaussian Noise," *IEEE Transactions on Information Theory*, Jan. 2001, 47(1), pp. 446-450.
28. R. D. Wesel, X. Liu, and W. Shi, "Trellis Codes for Periodic Erasures," *IEEE Transactions on Communications*, June 2000, 48(6), pp. 938-947.
29. R. D. Wesel and J. M. Cioffi, "Trellis Codes for Periodic Interleavers," *IEEE Communications Letters*, April 1999, 3(4), pp. 103-105.
30. R. D. Wesel, and J. Cioffi, "Achievable Rates for Tomlinson-Harashima Precoding," *IEEE Transactions on Information Theory*, Mar. 1998, 44(2), pp. 824-831.

#### CONFERENCE PUBLICATIONS (LONG PAPERS)

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1. A. Marinoni, P. Savazzi and R. D. Wesel, "On q-ary LDPC Code Design for a Low Error Floor". Globecom 2011, Houston, Texas, USA, December 2011.
2. T.-Y. Chen, D. Divsalar, J. Wang and R. D. Wesel, "Protograph-Based Raptor-Like LDPC Codes for Rate Compatibility with Short Blocklengths". Globecom 2011, Houston, Texas, USA, December 2011.
3. J. Wang, H. Shankar and R. D. Wesel, "Soft Information for LDPC Decoding in Flash: Mutual-Information Optimized Quantization". Globecom 2011, Houston, Texas, USA, December 2011.
4. T. A. Courtade, J. Wang, and R. D. Wesel, "Superposition Coding to Support Multiple Streams, Priorities, and Channel Capacities in the Context of GMSK", to appear in MILCOM, 2011.
5. T. A. Courtade and R. D. Wesel, "Weighted Universal Recovery, Practical Secrecy, and an Efficient Algorithm for Solving Both". Forty-Ninth Annual Allerton Conference on Communication, Control, and Computing, 2011.
6. B. Xie, M. van der Schaar, T. A. Courtade and R. D. Wesel, "Minimizing Weighted Sum Finish Time for One-To-Many File Transfer in Peer-To-Peer Networks". Forty-Ninth Annual Allerton Conference on Communication, Control, and Computing, 2011.
7. T. A. Courtade and R. D. Wesel, "Multiterminal Source Coding with an Entropy-Based Distortion Measure". ISIT 2011, Saint-Petersburg, Russia, August 2011.

8. J. Wang, L. Dolecek, Z. Zhang and R. D. Wesel, "Absorbing Set Spectrum Approach for Practical Code Design". ISIT 2011, Saint-Petersburg, Russia, August 2011.
9. J. Wang, L. Dolecek and R. D. Wesel, "Controlling LDPC Absorbing Sets via the Null Space of the Cycle Consistency Matrix". ICC 2011, Kyoto, Japan, June 2011.
10. T.-Y. Chen, N. Seshadri and R. D. Wesel, "A Sphere-Packing Analysis of Incremental Redundancy with Feedback". ICC 2011, Kyoto, Japan, June 2011.
11. J. Wang, L. Dolecek and R. D. Wesel, "LDPC Absorbing Sets, the Null Space of the Cycle Consistency Matrix, and Tanner's Constructions". ITA 2011, San Diego, CA, USA, Feb. 2011.
12. T.-Y. Chen, N. Seshadri and R. D. Wesel, "Incremental Redundancy: A Comparison of a Sphere-Packing Analysis and Convolutional Codes". ITA 2011, San Diego, CA, USA, Feb 2011.
13. T. A. Courtade and R. D. Wesel, "Efficient Universal Recovery in Broadcast Networks". Forty-Eighth Annual Allerton Conference on Communication, Control, and Computing: Monticello, IL, Sept. 29-Oct. 1, 2010.
14. E. L. Valles, R. D. Wesel, J. D. Villasenor, C. R. Jones and M. Simon, "Pilotless Carrier Phase-Synchronization via LDPC Code Feedback". MILCOM 2010: San Jose, CA, Oct. 31 - Nov 3, 2011.
15. T. A. Courtade, B. Xie, and R. D. Wesel, "Optimal Exchange of Packets for Universal Recovery in Broadcast Networks". MILCOM 2010: San Jose, CA, Oct. 31 - Nov 3, 2010.
16. A. Marinoni, P. Savazzi and R. D. Wesel, "Protograph-based q-ary LDPC Codes for Higher-Order Modulation". ISTC 2010: Brest, France, Sept 6-10, 2010.
17. T. A. Courtade and R. D. Wesel, "A Deterministic Approach to Rate-Compatible Fountain Communication". ITA 2010: La Jolla, CA, Jan. 31 - Feb. 5, 2010.
18. B. Xie and R. D. Wesel, "Optimal Natural Encoding Scheme for Discrete Multiplicative Degraded Broadcast Channels". ISIT 2009: Seoul, Korea, June 28-July 3, 2009.
19. A. Marinoni, T. A. Courtade and R. D. Wesel, "Spectrally Efficient LDPC Coded Modulations". GTTI 2009: sessione Trasmissione, Parma, Italy, June 23-25, 2009. *Winner of the Francesco Carassa award for the best paper from a young scientist in the sessione Trasmissione.*
20. T. A. Courtade and R. D. Wesel, "A Cross-Layer Perspective on Rateless Coding for Wireless Channels". ICC 2009, Dresden, Germany, June 14-18, 2009.
21. B. Xie and R. D. Wesel, "Optimal Independent-Encoding Schemes for Input-Symmetric Degraded Broadcast Channels". ITA 2008, San Diego, USA, Jan. 27 - Feb. 1, 2008.
22. B. Xie and R. D. Wesel, "A Mutual Information Invariance Approach to Symmetry in Discrete Memoryless Channels". ITA 2008, San Diego, USA, Jan. 27 - Feb. 1, 2008.
23. Miguel Griot, A. I. Vila Casado, and R. D. Wesel, "Nonlinear Turbo Codes for Higher-Order Modulations". ICC 2008, Beijing, China, May 2008.
24. Y.M. Chang, A. I. Vila Casado, M.F. Chang, and R. D. Wesel, "Lower-Complexity Layered Belief Propagation Decoding of LDPC Codes". ICC 2008, Beijing, China, May 2008.
25. M. Griot, A. I. Vila Casado, and R. D. Wesel, "On the Design of Arbitrarily Low-Rate Turbo-Codes". Globecom 2007, Washington, D.C., November 2007.
26. A. I. Vila Casado, M. Griot and R. D. Wesel, "Improving LDPC Decoders via Informed Dynamic Scheduling". ITW 2007, Lake Tahoe, CA, USA, September 2007, pp 208-213.



27. B. Xie, M. Griot, A. I. Vila Casado and R. D. Wesel, "Optimal Transmission Strategy and Capacity Region for Broadcast Z Channels". ITW 2007, Lake Tahoe, CA, USA, September 2007, pp 390-395.
28. A. I. Vila Casado, M. Griot and R. D. Wesel, "Informed Dynamic Scheduling for Belief-Propagation Decoding of LDPC Codes". ICC 2007, Glasgow, Scotland, July 2007, pp 932-937.
29. H. Chan, M. Griot, A. Vila Casado, R. Wesel, I. Verbauwhede "High Speed Channel Coding Architectures for the Uncoordinated OR Channel". IEEE 17th INTERNATIONAL CONFERENCE ON Application-specific Systems, Architectures and Processors (ASAP), Steamboat Springs, Colorado, September 2006.
30. M.Griot, A. I. Vila Casado and R. D. Wesel "Non-linear Turbo Codes for Interleaver-Division Multiple Access on the OR Channel". Globecom 2006, 27 Nov. - 1 Dec., San Francisco, USA.
31. W.-Y. Weng, B. Xie and R. D. Wesel "Universal Space-Time Serially Concatenated Trellis Coded Modulations". Globecom 2006, 27 Nov. - 1 Dec., San Francisco, USA.
32. A. I. Vila Casado, S. Valle, W.-Y. Weng, and R. D. Wesel "Constant-Blocklength Multiple-Rate LDPC Codes for Analog-Decoding Implementations". Proceedings Analog Decoding Workshop, June 2006.
33. E.Valles, C. Jones, R. Wesel and J. Villasenor "Carrier and Timing Synchronization of BPSK via LDPC Code Feedback". IEEE 40th Asilomar Conference on Signals, Systems and Computers. Pacific Grove,CA. Nov.2006.
34. M. Simon, E. Valles, C. Jones, R. Wesel and J. Villasenor "Information-Reduced Carrier Synchronization of BPSK and QPSK Using Soft Decision Feedback" The IEEE 44th Annual Allerton Conference on Communication, Control and Computing. Urbana,IL Sep. 2006.
35. M. Griot, A. I. Vila Casado, W.-Y. Weng, H. Chan, J. Basak, E. Yablonovitch, I. Verbauwhede, B. Jalali, and R. D. Wesel "Trellis Codes with Low Ones Density for the OR Multiple Access Channel" , IEEE ISIT, Seatte, USA, July 2006.
36. M.Griot, A. I. Vila Casado, W.-Y. Weng, H. Chan, J. Basak, E. Yablonovitch, I.Verbauwhede, B. Jalali, and R. D. Wesel "Interleaver-Division Multiple Access on the OR Channel" Information Theory and Applications workshop. San Diego, 2006.
37. Yang Han, William E. Ryan and Wesel R. D. "Dual-Mode Decoding of Product Codes with Application to Tape Storage" , IEEE GlobeCom 2005. St Louis, MO., vol. 3, 28 Nov.-2 Dec. 2005, pp 1255-1260.
38. Valles E., Vila Casado A. I., Blaum M., Villasenor J and Wesel R. D., "Hamming Codes Are Rate-Efficient ArrayCodes" , IEEE GlobeCom 2005. St Louis, MO., Vol. 3, 28 Nov.-2 Dec. 2005, pp 1320-1324.
39. Kose C. and Wesel R. D., "Universal Space-Time Codes from standard trellis codes" , *GlobeCom 2004*, Dallas, TX, Nov. 29-Dec. 3, 2004, pp 391-395.
40. Shi J. and Wesel R. D., "Channel Eigenvector-Invariant Space-Time Constellations" , *GlobeCom 2004*, 29 Nov.-3 Dec. 2004, pp 530-534
41. Shi J. and Wesel R. D., "Universal Codes with Finite Block Lengths" , *MilCom 2004*, 31 Oct.-3 Nov. 2004, pp 1338-1344
42. Ramamoorthy A. and Wesel R. D., "Analysis of an Algorithm for Irregular LDPC Code Construction," ISIT 2004, Chicago, Illinois

43. Shi J. and Wesel R. D., "Rotationally Invariant Space-Time Constellations," ISIT 2004, Chicago, Illinois Shi J. and Wesel R. D., "Channel Eigenvector-Invariant Space-Time Constellations" *GlobeCom 2004*, Dallas, TX, Nov. 29-Dec. 3, 2004, pp 391-395.
44. Vila Casado A. I., Weng W. and Wesel R. D., "Multiple-Rate Low-Density Parity-Check Codes with Constant Block Length" , *Conference Record of Thirty-Eighth Asilomar Conf. on Signals, Systems and Computers*, Pacific Grove, CA, Nov. 7-10, 2004, pp 2010-2014.
45. Matache A., Jones C and Wesel R. D., "Reduced Complexity MIMO Detectors for LDPC Coded Systems" , *MilCom 2004*, 31 Oct.-3 Nov. 2004, pp 1073-1079
46. Ramamoorthy A. and Wesel R. D., "Expansion Properties of Generalized ACE Codes", *42nd Allerton Conference on Communication, Control and Computing 2004*, Monticello, Illinois
47. Weng W., Ramamoorthy A. and Wesel R. D., "Lowering the Error Floors of High-Rate LDPC Codes by Graph Conditioning," *VTC 2004*, September 2004, Los Angeles, California, pp 2549-2553.
48. Chan H., Hodjat A., Shi J., Wesel R. D. and Verbauwhe I., "Streaming Encryption for a Secure Wavelength and Time Domain Hopped Optical Network," *IEEE Intl. Conf. on Information Technology (ICIT) 2004*.
49. Ramamoorthy A. and Wesel R. D., "Construction of Short Block Length Irregular LDPC Codes," *ICC 2004*, Paris, June 2004.
50. Ramamoorthy A., Shi J., and Wesel R. D., "On the Capacity of Network Coding for Random Networks," *Allerton Conference on Communication, Control and Computing*, October 2003
51. Jones C., Matache A., Tian T., Villasenor J. and Wesel R. D., "The Universality of LDPC Codes on Wireless Channels," *MilCom 2003*, Boston, MA, October 2003
52. J. Shi and R. D. Wesel, "Further Error Event Diagram Reduction Using Algorithmic Techniques," *International Conference on Communications (ICC) 2003*, Ankorage, AK, May 2003.
53. C. Kose, W. Weng, and R. D. Wesel, "Serially Concatenated Trellis Coded Modulation for the Compound Periodic Erasures Channel," *International Conference on Communications (ICC) 2003*, Ankorage, AK, May 2003, pp2953-2957.
54. T. W. Sun, R. D. Wesel, M. R. Shane, and K. Jarett, "Superposition Turbo TCM for Multi-Rate Broadcast," *International Conference on Communications (ICC) 2003*, Ankorage, AK, May 2003.
55. T. Tian, C. Jones, J. D. Villasenor, and R. D. Wesel, "Construction of Irregular LDPC Codes with Low Error Floors," *International Conference on Communications (ICC) 2003*, Ankorage, AK, May 2003.
56. C. Kose and R. D. Wesel, "Universal Space-Time Trellis Codes," *Globecom 2002*, Taipei, Taiwan, November 2002.
57. C. Jones, T. Tian, A. Matache, R.D. Wesel, and J. Villasenor, "Robustness of LDPC Codes on Periodic Fading Channels," *Globecom 2002*, Taipei, Taiwan, November 2002.
58. M. R. Shane and R. D. Wesel,, "Reduced Complexity Iterative Demodulation and Decoding of Serial Concatenated CPM," *International Conference on Communications (ICC) 2002*, New York, NY, April 28-May 2, 2002.
59. A. Matache and R. Wesel, "Trellis Coding for Diagonally Layered Space-Time Systems," *International Conference on Communications (ICC) 2002*, New York, NY, April 28-May 2, 2002.
60. C. Kose and R. D. Wesel,, "Performance of Likelihood Ratio Tests under Incorrect Models" *35th Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, Nov. 2001.

61. M. R. Shane and R. D. Wesel, "Reduced Complexity Iterative Demodulation and Decoding of Serial Concatenated CPM," *35<sup>th</sup> Asil. Conf. on Signals, Systems, and Computers*, Pacific Grove, CA, Nov. 2001.
62. A. Matache and R. Wesel, "Trellis Coding for Layered Space-Time Systems," *35<sup>th</sup> Asilomar Conference on Signals, Systems, and Computers*, (invited) Pacific Grove, CA, Nov. 2001.
63. C. Komninakis and R. D. Wesel, "Trellis Turbo-codes in Flat Rayleigh Fading with Diversity," *Globecom 2001*, San Antonio, TX, November 25-29, 2001.
64. C. Fragouli and R. Wesel, "Bit vs. Symbol Interleaving for Parallel Concatenated Trellis Coded Modulation," *Globecom 2001*, San Antonio, TX, November 25-29, 2001.
65. C. Komninakis, R. D. Wesel, and L. Vandenberghe, "Capacity of the Binomial Channel, or Minimax Redundancy for Memoryless Sources," *IEEE International Symposium on Information Theory*, June 24-29, 2001, Washington D. C., page 127.
66. C. Fragouli, R. Wesel, Dirk Sommer, and Gerhard Fettweis, "Turbo Codes with Non-Uniform QAM Constellations," *International Conference on Communications (ICC) 2001*, Helsinki, Finland, June 2001, pp.70-73.
67. C. Kose and R. D. Wesel, "Code Design Metrics For Space-Time Systems Under Arbitrary Fading," *ICC 2001*, Helsinki, Finland, June 2001, pp. 1099-1103.
68. C. Fragouli, C. Komninakis, and R. D. Wesel, "Minimality Under Periodic Puncturing," *ICC 2001*, Helsinki, Finland, June 2001, pp. 300-304.
69. X. Liu, P. Ormeci, R. Wesel, and D. Goeckel, "Bandwidth-Efficient, Low-Latency Adaptive Coded Modulation Schemes for Time-Varying Channels," *ICC 2001*, Helsinki, Finland, June 2001, pp. 2211-2215.
70. W. Shi, C. Komninakis, R. Wesel, and B. Daneshrad, "Robustness of Space-Time Turbo Codes," *ICC 2001*, Helsinki, Finland, June 2001, pp. 1700-1704.
71. T. W. Sun and R. D. Wesel, "Constellation Labeling for Error-Resilient Source Coding of PAM," *35<sup>th</sup> Annual Conference on Information Sciences and Systems*, March 21-23, 2001, The Johns Hopkins University, Baltimore, Maryland, page 295.
72. M. Shane and R. D. Wesel, "Tight Bounds on the Mutual Information of the Binary Input AWGN Channel," *35<sup>th</sup> Annual Conference on Information Sciences and Systems*, March 21-23, 2001, The Johns Hopkins University, Baltimore, Maryland, page 117.
73. M. Shane and R. Wesel, "Parallel Concatenated Turbo Codes for Continuous Phase Modulation," (invited) *2000 Wireless Comm. and Networking Conf.*, Sept 24-28, 2000, 6 pages.
74. W. Shi, T. Sun, and R. D. Wesel, "Optimal Binary Distributed Detection," *2000 International Symposium on Information Theory*, Sorrento, Italy, June 2000, pp. 437.
75. R. D. Wesel and X. Liu, "Edge-Profile Optimal Constellation Labeling," *IEEE International Conference on Communications 2000*, New Orleans, LA, June 2000, pp. 1198-1202.
76. C. Komninakis, C. Fragouli, A. H. Sayed, and R. D. Wesel, "Adaptive Multi-Input Multi-Output Fading Channel Equalization Using Kalman Estimation," *ICC 2000*, New Orleans, LA, June 2000, pp. 1655-1659.
77. Q. Zhang, P. K. Varshney, and R. D. Wesel, "Optimal Distributed Binary Hypothesis Testing with Independent Identical Sensors," *2000 Conference on Information Sciences and Systems*, Princeton University, March 15-17, 2000, 6 pages.
78. C. Komninakis and R. D. Wesel, "Pilot-Aided Joint Data and Channel Estimation in Flat Fading," *Comm. Theory Symp. at Globecom 99*, Rio de Janeiro, Brazil, Dec. 5-9, 1999, pp. 2534-9.

79. C. Fragouli and R. D. Wesel, "Semi-Random Interleaver Design Criteria," *Communication Theory Symposium at Globecom 99*, Rio de Janeiro, Brazil, December 5-9, 1999, pp. 2352-6.
80. C. Komninakis and R. D. Wesel, "Non-Pilot-Aided Iterative Decoding for Joint Data Recovery and Channel Estimation in Fading," *33rd Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA. October 24-27, 1999, pp. 1122-1126.
81. C. Fragouli, C. Komninakis, A. H. Sayed, R.D. Wesel, "Channel Estimation and Equalization in Fading," *33rd Asilomar Conference on Signals, Systems and Computers*, Pacific Grove, CA. October 24-27, 1999, pp. 1159-1163.
82. W. Shi, T. Sun, R. Wesel, "Optimal Binary Thresholds for Distributed Detection in Gaussian Noise," *33rd Asilomar Conf. on Sig., Sys., Comp.*, Pac. Grove, CA. Oct. 24-27, 1999, pp. 675-9.
83. K. Lakovic, J. Villasenor, and R. D. Wesel, "Robust Joint Huffman and Convolutional Decoding," *VTC-Fall-99*, Amsterdam, The Netherlands, September 19-22, 1999, pp. 2551-5.
84. C. Komninakis and R. D. Wesel, "Iterative Joint Data and Channel Estimation in Correlated Flat Rayleigh Fading," in proceedings of the *7th International Conference on Advances in Communications and Control*, June 28-July 2, 1999, Athens, Greece, pp. 385-390.
85. C. Fragouli and R. D. Wesel, "Convolutional Codes and Matrix Control Theory," in proceedings of the *7th International Conference on Advances in Communications and Control*, June 28-July 2, 1999, Athens, Greece, pp. 317-328.
86. R. D. Wesel, "Reduced Complexity Trellis Code Transfer Function Computation," in the *Communication Theory Miniconference in conjunction with ICC 99*, June 6-10, 1999, pp. 37-41.
87. C. Fragouli and R. D. Wesel, "Symbol Interleaved Parallel Concatenated Trellis Coded Modulation," in the *Comm. Theory Miniconf. in conj. with ICC 99*, June 6-10, 1999, pp. 42-46.
88. P. Ormeci, D. L. Goeckel, and R. D. Wesel, "Adaptive Bit-Interleaved Coded Modulation for Time-Varying Channels Using Outdated Fading Estimates," in proceedings of the *33rd Annual Conference on Information Sciences and Systems*, 6 pages.
89. H. Zou, H. J. Kim, S. Kim, B. Daneshrad, R. Wesel, W. Mangione-Smith, "Equalized GMSK, Equalized QPSK, and OFDM: A Comparative Study for High-speed Wireless Indoor Data Communications," in *1999 Veh. Tech. Conf.*, May 16-20, 1999, Houston, TX, pp.1106-10.
90. A. Bernard, X. Liu, R. Wesel and A. Alwan, "Embedded Joint Source-Channel Coding of Speech using Symbol Puncturing in Trellis Code," in the Proceedings of *ICASSP 99*, vol. 5, Phoenix, AZ, March 1999., pp. 2427-2430.
91. A. Bernard, X. Liu, R. Wesel and A. Alwan, "Channel Adaptive Joint Source-Channel Coding of Speech," Proc. *32nd Asilomar Conf. on Sig., Sys, and Comp.*, Pac. Grove, CA, Nov. 98, pp. 357-361.
92. W. Shi and R. D. Wesel, "The Effect of Mismatch on Decision-Feedback Equalization and Tomlinson-Harashima Precoding," in *Thirty-Second Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, November 2-5, 1998, pp. 1743-1747.
93. R. D. Wesel and X. Liu, "Analytic Techniques for Periodic Trellis Codes," in *Thirty-Sixth Annual Allerton Conf. on Communications, Control, and Computing*, Sept. 23-25, 1998, pp. 39-48.
94. X. Liu and R. D. Wesel, "Profile Optimal 8-QAM and 32-QAM Constellations," in *Thirty-Sixth Annual Allerton Conf. on Comm., Control, and Computing*, Sept. 23-25, 1998, pp. 136-145.
95. W. Shi and R. D. Wesel, "When the Best Decision Feedback Equalizer is a Linear Equalizer," in *Thirty-Sixth Annual Allerton Conference on Control, and Computing*, Sept. 23-25, 1998, pp. 338-39.

96. R. D. Wesel, X. Liu, W. Shi, and J. M. Cioffi, "Trellis Codes for Compound Periodic Gaussian Channels," in Proceedings of the *1998 International Symposium on Information Theory*, August 16-21, 1998, Cambridge, MA, pp. 462.
97. R. D. Wesel, X. Liu, and W. Shi, "Periodic Symbol Puncturing of Trellis Codes," in proceedings of *Thirty-First Asilomar Conf. on Sig., Sys., and Computers*, Nov. 2-5, 1997, pp. 172-6.
98. R. D. Wesel, C. Komninakis, and X. Liu, "Towards Optimality in Constellation Labeling," in proceedings of the *Communication Theory Mini Conference at Globecom 97*, Phoenix, AZ, November 3-8, 1997, pp. 23-27.
99. R. D. Wesel, and J. M. Cioffi, "Joint Interleaver and Trellis Code Design," in proceedings of *Globecom 97*, Phoenix, AZ, November 3-8, 1997, pp. 939-943.
100. R. D. Wesel, and J. Cioffi, "Fundamentals of Coding for Broadcast OFDM," in *Twenty-Ninth Asilomar Conference on Signals, Systems, and Computers*, October 30, 1995, pp. 2-6.
101. R. D. Wesel, and J. Cioffi, "Achievable Rates for Tomlinson-Harashima Precoding," *1995 International Symposium on Information Theory*, September 1995, pp. 399.
102. R. D. Wesel, and J. Cioffi, "Precoding and the MMSE-DFE," Invited paper in *Twenty-Eighth Asilomar Conference on Signals, Systems, and Computers*, November 1, 1994, pp. 1144-1148.
103. R. D. Wesel and R. M. Gray, "Bayes risk weighted VQ and Learning VQ," in *Data Compression Conference*, Snowbird, Utah, March 1994, pp. 400-409.
104. T. M. Cover and R. D. Wesel, "A Gambling Estimate of the Rate-Distortion Function for Images," in *Data Compression Conference*, Snowbird, Utah, March 1994 (abstract only).

## BOOK CHAPTERS

---

1. H. Chan, A. Hodjat, J. Shi, R. D. Wesel and I. Verbauwhede, "Streaming Encryption for a Secure Wavelength and Time Domain Hopped Optical Network," Ch. 14 in *Embedded Cryptographic Hardware* (N. Nedjah and L. Mourelle, eds.). Nova Science Publishers, 2004
2. R. D. Wesel, "Convolutional Encoding" in *Wiley Encyclopedia of Telecommunications*, Edited by John Proakis, John Wiley, 2003.
3. R. D. Wesel, "Error Control" Chapter 6 in *Wireless Multimedia Communications*, Addison Wesley Longman, 1998.

## PATENTS

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1. A. I. Vila Casado, W.-Y. Weng, R. D. Wesel, N. Moschini, M. Sitti, S. Valle, E. Yeo, "Variable-Rate Low-Density Parity Check Codes with Constant Blocklength". U.S. Patent #7802172, September 21, 2010.
2. I. S. Djokovic, R. D. Wesel, E. J. Infusino, M. K. Tsatsanis, "Multi-channel communication system for multiple input, multiple output processing of an encoded signal". U.S. Patent #7415086, August 19, 2008.
3. G. G. Raleigh, Michael A. Pollak, V. K. Jones, R. D. Wesel, "System and Method for I/Q Trellis Coded Modulation," U.S. Patent #6158041, December 5, 2000.

4. R. D. Wesel and J. M. Cioffi, "Transmission System Using Code Designed for Transmission with Periodic Interleaving,"  
U.S. Patent #6125150, September 26, 2000.
5. R. D. Wesel, "Adaptive Frequency Dependent Compensation for Telephone Channels,"  
U. S. Patent #5280525, January 18, 1994.
6. R. L. Daggett and R. D. Wesel, "Echo Protection Tone Detection and Regeneration for Digital Transmission of Facsimile Calls,"  
U. S. Patent #5216519, June 1, 1993.