

# VITA

## Phillip E. Pace

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P. E. Pace is a professor in the Department of Electrical and Computer Engineering at the Naval Postgraduate School. He received the B.S. and M.S. degrees from the Ohio University in 1983 and 1986 respectively, and the Ph.D. from the University of Cincinnati in 1990 — all in electrical and computer engineering. Prior to joining NPS, he spent two years at General Dynamics Corporation, Air Defense Systems Division, as a design specialist in the Radar Systems Research Engineering department. Before that, he was a member of the technical staff at Hughes Aircraft Company, Radar Systems Group, for five years. He received the Hughes Aircraft Company Full Study Fellowship in 1984 and was the winner of the Kroeger Foundation Fellowship Award in 1989. Dr. Pace has been the Chairman of the N2/N6 Threat Missile Simulator Validation Working Group since Oct. 1996 and was a participant on the Navy's NULKA Blue Ribbon Panel in Jan. 1999. He is the current director for the NPS Center for Joint Services Electronic Warfare and the author of three textbooks, *Advanced Techniques for Digital Receivers*, Artech House Publishing, 2000, and *Detecting and Classifying Low Probability of Intercept Radar*, Artech House Publishing, 2004 and the 2nd Edition in 2009. Dr. Pace was awarded the NPS Outstanding Research Achievement Award in 1993, 1994 and 2000 for his work in electronic warfare. He was awarded the NPS Graduate School of Engineering and Applied Science *Merit Award for Teaching* in 2009 and is a major participant in the international Engineers and Scientists Exchange Program (ESEP). Dr. Pace has been a principal investigator on numerous research projects in the areas of receiver design, signal processing, electronic warfare and weapon systems analysis. He is an Associate Editor *IEEE Transactions on Aerospace and Electronics Systems Engineering*, (EW), a life member of the AOC and is a Fellow of the IEEE.

### EDUCATION

DOCTOR OF PHILOSOPHY IN ELECTRICAL ENGINEERING, August 1990, The University of Cincinnati.

MASTERS OF SCIENCE IN ELECTRICAL ENGINEERING, March 1986, The Ohio University.

BACHELORS OF SCIENCE IN ELECTRICAL ENGINEERING (Cum Laude), March 1983, Graduation with honors, The Ohio University.

## PROFESSIONAL EXPERIENCE

Sep. 1992 – Present Assistant Professor (August 1995–June 1995), Associate Professor (July 1995–July 2001), Tenured (July 1997), Professor (July 2001–present), Department of Electrical and Computer Engineering, Naval Postgraduate School, Code EC/PC, Monterey, CA. 93943. Director: Center for Joint Services Electronic Warfare. Member of the ECE Research Committee, Alternate Representative to the Academic Council.

Aug. 1990 – Aug. 1992 Design Specialist, Radar Systems Engineering, Air Defense Systems Division, General Dynamics Corporation.

Sep. 1987 – Aug. 1990 Signal Processing and Systems, The University of Cincinnati.

Mar. 1983 – Sep. 1987 Member of the Technical Staff, F/A-18 Program Office, Radar Systems Group, Hughes Aircraft Company.

## SIGNIFICANT CONTRIBUTIONS

To the Naval Postgraduate School

### (a) Center for Joint Services Electronic Warfare

The Center for Joint Services Electronic Warfare (CJSEW) was established in 1995 in order to provide a major focal point for both industrial and Department of Defense (DoD) electronic warfare research. With the integration of teaching and research, faculty and students from several academic groups and departments, the CJSEW has provided a host of analytical and technical skills in the areas of simulation science and electronic systems engineering to respond to the challenges of network-enabled warfare and Joint Vision 2020. The CJSEW has a strong working relationship with N2/N6, the Naval Research Laboratory (NRL), Commander, Operational Test and Evaluation Force (COMOPTEVFOR), the Office of Naval Intelligence and the Integrated Warfare Systems 2 (IWS2) communities and many others.

- Chairing since 1996, the N2/N6 Surface Navy's Threat Anti-Ship Capable Missile Simulator Validation Working Group (SVWG).
- CJSEW faculty leading in the development and design of low probability of intercept radar and corresponding ELINT signal processing techniques for detecting these unseen emitters.
- Selected in 1999 for 4-member Navy's Nulka (MK53) Blue Ribbon Panel to assist in the analysis of the Operational Evaluation (OPEVAL) of the Nulka in support of a milestone III decision. The blue ribbon panel was set up because COMOPTEVFOR *failed* the Nulka during the OT.

- Selected in 2002 for the AoA AEA Software Support Activity (SSA) for the PMA-234 Electronic Warfare Network Centric Simulation (EWNCS) software evaluating the aircraft for the replacement of the EA-6B Prowler aircraft for electronic attack. Activities performed included obtaining the source code and the latest classified RT-4 scenarios and running the various ingress scenarios.
- Developed in 2002 the NPS *Design, Performance and Analysis of Unmanned Aerial Vehicle Systems* workshop. This was attended by military officers and civilians who had a technical interest in the design of UAVs and UCAVs.
- In 2004, faculty approval was obtained for the new Sensor Systems Engineering Option within the Department of Electrical and Computer Engineering.

#### (b) Awards

- Naval Postgraduate School Outstanding Research Achievement Award in 1993 for his work in electronic warfare.
- Naval Postgraduate School Outstanding Research Achievement Award in 1994 for his work in electronic warfare.
- AOC *Academic Training International Award* for exceptional performance in teaching and developing EW educational programs with cutting-edge technology, remarkable research productivity and scholarly publications, 1995.
- Naval Postgraduate School Outstanding Research Achievement Award in 2000 for his work in electronic warfare.
- Naval Postgraduate School GSEAS Merit Award for Teaching, 2009.

#### (c) Professional Development

- General Chair, the Technology for Information Operations (TIO) 3-week workshop (MASL P179220) held every year since 1996 – for the international community to give participants the opportunity to see the relevant research going on in the various CJSEW groups and departments.
- In 1997, participated in a 3-month sabbatical at the Integrated Electronic Warfare Simulations Branch, Tactical Electronic Warfare Division, Naval Research Laboratory in Washington D. C. to perform research on ships self defense and threat missile simulators.
- Short Course Chair, ISCAS, Monterey, 1998.
- Review Committee, IEEE Radar Conferences
- Review Committee, Tri-Service Radar Conferences

- Directing and coordinating the NPS Design, Performance and Analysis of Unmanned Aerial Vehicle Systems short course that started in 2003. The course was first given April 7-11, 2003 and is intended for military officers and civilians who have a technical interest in the design of UAVs and UCAVs.
- Attended a 2-day SEA POWER-21 Short Course (Feb. 24 – 25, 2004).
- Co-Editor in 2004 for the Proceedings Volume VI of the International Conference on Computing, Communications and Control Technologies, Austin, TX.
- Co-Chaired in 2004 two invited sessions, Computing, Communication and Control in Global Ballistic Missile Defense I and II, 8-14-04, 8-15-04.
- Pattern Recognition SESSION CHAIR, 8th IASTED International Conference on Signal and Image Processing, SIP2006, Honolulu, HI Aug. 14 - 16, 2006.
- Served on ONR Code 31, 6.1 Review Board, July 9 - 10, 2007.
- General Chair, Low Probability of Intercept, ELINT Conference, Naval Postgraduate School, Sponsored by the AOC, Monterey CA, Nov. 17 - 19, 2009.
- General Chair, AOC Low Probability of Intercept, ELINT Conference, Naval Postgraduate School, Sponsored by the AOC, Monterey CA, Feb. 15 - 17, 2011.
- Associate Editor, Technical Editor, *IEEE Transactions on Aerospace and Electronic Systems: Electronic Warfare*, Nov. 2013.

## Record of Research

### **PATENTS**

- P1 Pace, P. E., “High-resolution encoding circuit and process for analog-to-digital conversion,” Naval Postgraduate School, U.S. Patent 5,617,092, Issued Apr. 4, 1997.
- P2 Pace, P.E., Styer, D., and Leino, R.E., “Wideband undersampling digital receiver,” Naval Postgraduate School, U.S. Patent 6,031,879, Issued Feb. 29, 2000.
- P3 Fouts, D. J. and Pace, P. E., “False target radar image generator for countering wideband imaging radars,” U. S. Patent 6,624,780, Issued Sept. 23, 2003.
- P4 Pace, P. E., Surratt, R. E., and Yeo, S. Y., “Signal Synthesizer and Method Therefore,” U. S. Patent 6,721,358, Issued April 13, 2004.
- P5 Pace, P. E. and Yeo, S-Y, “Signal Synthesizer and Method Therefore,” U.S. 7,154,431, Issued Dec. 26, 2007.
- P6 Pace, P. E., Arvizo, M. R., Calusdian, J. ,Luke, B., Hollinger, K. B. , “Photonic Analog-to-Digital Converter Using the Robust Symmetrical Number System,” US 8,269,658, Issued Sept. 18, 2012.
- P7 Pace, P. E., Tedesso, T., Calusdian, J., “Method and System for Robust Symmetrical Number System Photonic Direction Finding,” U.S. 9,590,740 March 7, 2017.
- P8 Pace, P. E., “Method and apparatus for detection of hazardous environmental conditions,” Provisional 62/033,738, Aug. 6, 2014.

## PUBLICATIONS

### Books

- B1 Pace, P. E., *Advanced Techniques for Digital Receivers*, Artech House Publishing, Boston, July 2000.
- B2 Pace, P. E., *Detecting and Classifying Low Probability of Intercept Radar*, Artech House Publishing, Boston, 2004.
- B3 Pace, P. E., *Detecting and Classifying Low Probability of Intercept Radar, 2nd Edition*, Artech House Publishing, Boston, 2009.

### Chapters in Books

- CB1 D. C. Jenn, P. E. Pace and J. P. Powers, “High-resolution acoustic arrays using optimum symmetrical-number-system processing,” *Acoustic Imaging*, Vol. 24, Hua Lee, Ed., Kluwer Academic/Plenum Publishers, New York. pp. 57-64, 2000.
- CB2 Pace, P. E., Jenn, D. C. and Powers, J. P., “Symmetrical number systems: Theory and Applications,” *Recent Research Developments in Electronics*,” Feb. 2003.

### Refereed Journal Papers

- J1 Pace, P. E., and Ramamoorthy, P. A., “Digital signal processing and filter synthesis concepts for applications in spectroscopy,” *Spectroscopy*, vol. 5, pp. 37–45, Nov. 1990.
- J2 Pace, P.E., Ramamoorthy, P. A., and Styer, D., “Resolution enhancement technique for guided-wave analog-to-digital converters,” *IEE Electronic Letters*, vol. 28, pp. 2174–2175, Nov. 1992.
- J3 Pace, P. E., and Taylor, L. L., “False alarm analysis of the envelope and envelope approximation GO CFAR processor,” *IEEE Transactions on Aerospace and Electronic Systems*, vol. 30, pp. 848–864, July 1994.
- J4 Pace, P. E., and Styer, D., “High resolution encoding process for an integrated optical analog-to-digital converter,” *Optical Engineering*, vol. 33, pp. 2638–2645, July 1994.
- J5 Pace, P. E., Ramamoorthy, P. A., and Styer, D., “A preprocessing architecture for resolution enhancement in high-speed ADCs,” *IEEE Transactions on Circuit and Systems-II: Analog and Digital Signal Processing*, vol. 41, pp. 373–379, 1994.

- J6 Pace, P. E., and Foster, C., “Beam propagation analysis of a parallel configuration of Mach-Zehnder interferometers,” *Optical Engineering*, vol. 33, pp. 2911–2921, Aug. 1994.
- J7 Foster, C. C., and Pace, P. E., “Numerical modeling of opto-electronic integrated circuits,” *Scientific Computing*, pp. 19–22, Oct. 1994.
- J8 Pace, P. E., Walley, R. D., Pieper, R. J., and Powers, J. P., “5-Bit guided-wave SNS transfer characteristics,” *IEE Electronics Letters*, vol. 31, pp. 1799–1800, Oct. 1995.
- J9 Pace, P. E., Schafer, J., and Styer, D., “Optimal SNS preprocessing for folding ADCs,” *IEEE Transactions on Circuits and Systems – II: Analog and Digital Signal Processing*, vol. 42, pp. 825–929, Dec. 1995.
- J10 Pace, P. E., Ying, S. J., Powers, J. P., and Pieper, R. J., “Integrated optical sigma-delta modulators,” *Optical Engineering*, vol. 35, pp. 1828–1836, July 1996.
- J11 Pace, P. E., Leino, R. E., and Styer, D., “Use of the symmetrical number system in resolving single-frequency under-sampling ambiguities,” *IEEE Transactions on Signal Processing*, vol. 45, pp. 1153–1160, May 1997.
- J12 Pace, P. E., Nishmura, B. H., Morris, W. M., and Surratt, R. E., “Effectiveness calculations in captive-carry HIL missile simulator experiments,” *IEEE Transactions on Aerospace and Electronic Systems*, Vol. 34, pp. 124–136, Jan. 1998.
- J13 Pace, H., and Pace, P.E., “Frequency management for the 21<sup>st</sup> century,” *Journal of Electronic Defense*, Vol. 21, pp. 21–25, Jan. 1998.
- J14 Jenn, D.C., Pace, P.E., Hatziathanasiou, T.N., and Vitale, R., “High resolution wideband direction finding arrays based on optimum symmetrical number system encoding,” *IEE Electronics Letters*, Vol. 34, pp. 1062–1064, June 1998.
- J15 Pace, P.E., and Burton, G.D., “Anti-ship cruise missiles: technology, simulation, and ship self-defense,” *Journal of Electronic Defense*, Vol. 21, pp. 51–56, Nov. 1998.
- J16 Pace, P.E., Styer, D., and Akin, I.A., “A Folding ADC preprocessing architecture employing a robust symmetrical number system with Gray-code properties,” *IEEE Transactions on Circuits and Systems–II: Analog and Digital Signal Processing*, Vol. 47, No. 5, pp. 462–467, May 2000.
- J17 Pace, P.E., Bewley, S.A., and Powers, J.D., “Fiber lattice accumulator design considerations for optical  $\Sigma\Delta$  analog-to-digital converters,” *Optical Engineering*, Vol. 39, No. 6, pp. 1517–1526, June 2000.

- J18 Pace, P.E., Styer, D., and Ringer, W.D., "An optimum SNS-to-binary conversion algorithm and pipelined field programmable logic design," *IEEE Transactions on Circuits and Systems-II: Analog and Digital Processing*, Vol. 47, No. 8, pp. 736-745, Aug. 2000.
- J19 Pace, P.E., Zulaica, D., Nash, M.D., DiMattesa, A.D., and Hosmer, A.C., "Relative targeting architectures for captive-carry HIL missile simulator experiments," *IEEE Transactions on Aerospace and Electronic Systems*, Vol. 37, No. 3, pp. 810-823 July 2001.
- J20 Pace, P.E., Wickersham, D., Jenn, D., and York, N., "High resolution phase sampled interferometry using symmetrical number systems," *IEEE Transactions on Antennas and Propagation*, Vol. 49 No. 10, pp. 1411-1423, Oct. 2001.
- J21 Syter, D. and Pace, P. E., "Two Channel RSNS Dynamic Range," *IEEE Transactions on Circuits and Systems Part I: Fundamental Theory and Applications*, Vol. 49, No. 3, pp. 395-397 March 2002.
- J22 Fouts, D.J.; Pace, P.E.; Karow, C.; Ekestorm, S.R.T., "A single-chip false target radar image generator for countering wideband imaging radars," *IEEE Journal of Solid-State Circuits*, Volume: 37 Issue: 6 pp. 751-759, June 2002
- J23 Pace, P. E., Fouts, D. J., Ekestorm, S., and Karow, C. "Digital false-target image synthesiser for countering ISAR," *IEE Proceedings - Radar, Sonar and Navigation - Volume 149, Issue 05* page 248-257, Oct 2002.
- J24 Pace, P. E., Fouts, D. J., Zulaica, D. P., "Digital Image Synthesizers: Are Enemy Sensors Really Seeing what's There?" *IEEE Aerospace and Electronic Systems Magazine*, pp. 3 - 7, Feb. 2006.
- J25 Luke B. L., and Pace, P. E., "N-Sequence RSNS ambiguity analysis," *IEEE Transactions on Information Theory*, Vol. 53, No. 5, pp. 1759 - 1766, May 2007.
- J26 Luke B. L., and Pace, P. E., "RSNS - to - binary conversion," *IEEE Transactions on Circuits and Systems - I: Regular Papers*, Vol. 54, No. 9, Sept. 2007.
- J27 Pace, P. E., and Ng, C. Y., "Costas CW frequency hopping radar waveform: Peak sidelobe improvement using Golay complementary sequences," *IEE Electronics Letters*, Vol. 46, No. 2, pp. 169 - 170, Feb. 2010.
- J28 Arvizo, M. R., Calusdian, J., Hollinger K. and Pace, P. E., "Robust Symmetrical Number System Preprocessing for Minimizing Encoding Errors in Photonic ADCs," *Journal of Optical Engineering*, Vol 50, No. 8, August 2011.

- J29 Paepolshiri, N., Pace P. E. and Jenn, D. C., “Extending the unambiguous range of polyphase P4 CW radar using the robust symmetrical number system,” *IET Radar Sonar and Navigation*, Vol. 6, No. 9, June 2012.
- J30 Maleh, R. Fudge, G. L., Boyle, F. A., and Pace, P. E., “Analog-to-information and the Nyquist Folding Receiver,” *IEEE Journal on Emerging and Selected Topics in Circuits and Systems*, Vol. 2, No. 3, pp. 564-578, Sept. 2012.
- J31 Wicht, M., Schott M. and Pace, P. E., “Increasing the flux measurement range of an rf-SQUID resonant detection circuit using the robust symmetrical number system,” *IEEE Trans on Applied Superconductivity*, Vol. 23, No. 2, April 2013.
- J32 Pace, P. E., Stanica, P., Luke, B., and Tedesso, T., “Extended closed-form expressions for the robust symmetrical number system dynamic range and an efficient algorithm for its computation,” *IEEE Transactions on Information Theory*, Vol. 60 No. 3, March, 2014.
- J33 Martinsen, T. Pace, P. E., Fisher, E. L., “Maneuver Warfare in the Electromagnetic Battlespace,” *Journal of Electronic Defense*, Oct. 2014.
- J34 T. Tedesso, T. Sewing, C. Calusdian, J. Pace, P. E., “Wideband Direction Finding Using a Photonic Robust Symmetrical Number System Technique” *Optical Engineering*, Vol. 53, No. 11, Nov. 2014.
- J35 Erdogan, A. Y., Gulum, T. O., Durak-Ata, L., Yildirim, T., Pace, P. E., “FMCW signal detection and parameter extraction by Cross-Wigner-Hough transform,” *IEEE Trans. on Aerospace and Electronic Systems*, Vol. 53, No. 2, 2017.
- J36 Gulum, T. O., Erdogan, A. Y., Durak-Ata, L., Yildirim, T., Pace, P. E., “Enhanced LPI Waveform Representation by Ambiguity-Domain Elliptical Gaussian Filtering,” *IEEE Trans. on Aerospace and Electronic Systems*, Vol. 53, No. 2, 2017.

### **Invited Conference Papers**

- IC1 Pace, P. E., “Research in high-speed ADCs at the Naval Postgraduate School,” Tri-Service Digital RF Memory and Digital Receiver Workshop, Atlanta, GA, July 1993 (INVITED).
- IC2 Pace, P. E., “Guided-wave SNS ADC transfer characteristics and applications,” Proceedings of the Tri-Service Digital RF Memory Workshop, Sep. 1995.
- IC3 Pace, P. E., Powers, J. P., Butler, J. M., and Bewley, S., “NPS research in digital antennas,” DARPA/ETO Photonic A/D Converter Technology Kick-Off Meetings, MIT Lincoln Laboratory, April 20, 1999.

## Refereed Conference Papers

- RC1 Pace, P.E., and Ramamoorthy, P.A., “An opto-electronic parallel interferogram processor for enhanced SNR efficiency in infrared spectroscopy,” *Quantum Limited Imaging and Information Processing Tech Digest*, vol. 13, MB4-1, Cape Cod, MA, Jun. 1989.
- RC2 Pace, P.E., and Ramamoorthy, P.A., “A hybrid electro-optical ESM intercept receiver,” *IEEE Int’l Conf. on Systems Engineering Tech Digest*, SPM-1.2, Dayton, OH, Aug. 1989.
- RC3 Pace, P.E., Ramamoorthy, P.A., and Styer, D., “A modified residue number system with applications in signal processing,” *IEEE 33rd Midwest Symp. on Circuits and Systems Tech. Digest*, Calgary, Canada, Aug. 1990.
- RC4 Pace, P.E., Ramamoorthy, P.A., and Styer, D., “Resolution enhancement techniques for guided-wave analog/digital converters,” *IEEE LEOS 92*, EOS 2.2, Boston, MA, Nov. 1992.
- RC5 Pace, P.E., and Esparza, J.A., “A preprocessing architecture for resolution enhancement in high-speed analog-to-digital converters,” *IEEE Int’l Symp. on Circuits and Systems*, paper 22.20, Chicago, IL, May 1993.
- RC6 Pace, P.E., Powers, J.P., Pieper, R.J., Walley, R., Yajakoshi, A., Crowe, C., and Nimri, B., “8-bit integrated optical SNS ADC,” *Proc. 27th Southeastern Symp. on System Theory*, Starkville, MS, pp. 144–148, Mar. 1995.
- RC7 Pace, P.E., and Schafer, J., “Decimation of encoding errors in an optimum SNS folding ADC,” *Proc. IEEE Int’l Symp. on Circuits and Systems*, Seattle, WA, pp. 1324–1327, May 1995.
- RC8 Pace, P.E., Brewer, D., Taylor, L., Laulusa, G., and Butt, E., “Harbor control search processing for detection of slow moving ships in adverse conditions,” *Record of the IEEE 1995 Int’l Radar Conf.*, pp. 269–275, May 1995.
- RC9 Pace, P.E., Ringer, W.P., Foster, K.D., and Powers, J.P., “Optical signal integrity and interpolation signal processing in wideband SNS digital antennas,” *Proc. 7th Annual DARPA Symp. on Photonic Systems for Antenna Applications*, pp. 112–117, Jan. 13, 1997.
- RC10 Pace, P.E., Atherton, A.F., and Powers, J.P., “Integrated optical accumulators with applications in sigma delta modulation,” *Proc. 7th Annual DARPA Symp. on Photonic Systems for Antenna Applications*, pp. 150–154, Jan. 13, 1997.

- RC11 Pace, H., Robertson, R.C., and Pace, P.E., “Frequency management and anti-jam communication technologies for the battlefield,” *Proc. 1997 Assoc. of Old Crows Western Region IW Technical Symp.*, San Antonio, TX, pp. 229–235, Apr. 1997.
- RC12 Gill, C.W., and Pace, P.E., “Neural prediction of missile dynamics during hardware in the loop captive-carry experiments,” *Proc. IEEE Intl. Conf. on Neural Networks*, Houston, TX, pp. 2208–2213, Jun. 1997.
- RC13 Pace, P.E., Styer, D., and Akin, I.A., “A folding ADC employing a robust symmetrical number system with Gray-code properties,” *Proc. IEEE Intl. Symp. on Circuits and Systems*, Monterey, CA, TPA 14-7, May 31–June 3, 1998.
- RC14 Pace, P.E., Styer, D., and Ringer, W.P., “Optimum SNS-to-binary conversion algorithm and FPGA realization,” *Proc. IEEE Intl. Symp. on Circuits and Systems*, Monterey, CA, TAA14-11, May 31–June 3, 1998.
- RC15 Jenn, D.C., Pace, P.E., Hatzithanasiou, T.N., and Vitale, R., “Symmetrical number system phase sampled DF antenna architectures,” *Proc. IEEE Antennas and Propagation Society Intl. Symp.*, Atlanta, GA, pp. 199–202, June 21–26, 1998.
- RC16 Bulter, J.M., Pace, P.E., and Powers, J.P., “Experimental results of a low-power sigma mode-locked laser for applications in mobile sampling of wideband antenna signals,” *PSAA-IX Proc. 9th Annual DARPA Symp. on Photonic Systems for Antenna Applications*, Thu 5-3, Naval Postgraduate School, Feb. 18, 1999.
- RC17 Pace, P.E., Bewley, S.A., and Powers, J.P., “Fiber lattice accumulator design considerations for optical  $\Sigma\Delta$  digital antennas,” *PSAA-IX Proc. 9th Annual DARPA Symp. on Photonic Systems for Antenna Applications*, Fri 10-1, Naval Postgraduate School, Feb. 19, 1999.
- RC18 Wickersham, D.J., Pace, P.E., Styer, D., Jenn, D.C., Vitale, R., and York, N.S., “High resolution DF architectures using a robust symmetrical number system encoding,” *Proc. of the IEEE International Conf. on Phased Array Systems and Technology*, Dana Point, CA, pp.169–172, May 22, 2000.
- RC19 Milne, P. and Pace, P.E., “Wigner distribution detection and analysis of FMCW and P-4 polyphase LPI waveforms,” *IEEE International Conf. on Acoustics, Speech and Signal Processing*, Orlando FL, May 2002.
- RC20 Copeland, D. and Pace, P.E., “Detection and analysis of FMCW and P-4 polyphase LPI waveforms using quadrature mirror filter trees,” *IEEE International Conf. on Acoustics, Speech and Signal Processing*, Orlando FL, May 2002.

- RC21 Jenn, D., Babb, C., and Pace, P. E., "High resolution wideband DF using the robust symmetrical number system," Radio Direction Finding Symposium, San Antonio Texas, May, 2002.
- RC22 F. Taboada, A. Lima, J. Gau, P. Jarpa, and P. E. Pace, "Intercept receiver signal processing techniques to detect low probability of intercept radar signals," Proceedings of the 5th Nordic Signal Processing Symposium, Hurtigruta Tromso-Trondheim, Norway 4-7, Oct. 2002.
- RC23 F. Bardanis, P. E. Pace, M. Tummala, "Kill Vehicle Effectiveness for Boost Phase Interception of Ballistic Missiles," Proceedings of the International Conference on Computing, Communications and Control Technologies, Volume VI, pp. 1-6, Austin, TX. Aug. 2004.
- RC24 G. Humali, P. E. Pace, M. Tummala, "Sensor Fusion Algorithms for Boost Phase Intercept," Proceedings of the International Conference on Computing, Communications and Control Technologies, Volume VI, pp. 19-24, Austin, TX. Aug. 2004.
- RC25 K. Uzun, P. E. Pace, M. Tummala, "Boost Phase Analysis of a Multi-Stage Ballistic Missile," Proceedings of the International Conference on Computing, Communications and Control Technologies, Volume VI, pp. 37-41, Austin, TX. Aug. 2004.
- RC26 K. Uzun, P. E. Pace, M. Tummala, "Guidance of a Multi-Stage Boost Phase Interceptor Using Offboard Sensors," Proceedings of the International Conference on Computing, Communications and Control Technologies, Volume VI, pp. 31-36, Austin, TX. Aug. 2004.
- RC27 K. Uzun, D. C. Jenn, P. E. Pace, M. Tummala, "Radar Cross-Section Prediction of a 3-Stage Ballistic Missile Using a Physical Optics Approximation," Proceedings of the International Conference on Computing, Communications and Control Technologies, Volume VI, pp. 25-30, Austin, TX. Aug. 2004.
- RC28 P. E. Pace, D. J. Fouts, D. P. Zulaica, "Counter-Targeting, Counter-Lock On Using Digital False Target Image Synthesizers," AOC Western Mountain Region Information Operations/Electronic Warfare Technical Symposium April 18 – 20, 2005.
- RC29 A. Aydin, P. E. Pace and M. Tummala, "Orbit selection for space based interception of a select ICBM case," Proceedings of the IEEE International Conference on Systems, Man and Cybernetics, pp. 1882-1888, Oct. 10 – 12, 2005.
- RC30 K. Yildiz, P. E. Pace and M. Tummala, "Electronic attack against boost phase ICBM defense systems," Proceedings of the IEEE International Conference on Systems, Man and Cybernetics, pp. 1889-1895, Oct. 10 – 12, 2005.

- RC31 R. G. Hutchins and P. E. Pace, "Improved Trajectory Tracking and Launch Point Determination for Ballistic Missile Defense," Proceedings of the SPIE Defense and Security Symposium – Signal and Data Processing of Small Targets, Session 5, April 20, 2006.
- RC32 S. M. Hurley, M. Tummala, T. O. Walker III, and P. E. Pace, "Impact Of Synchronization On Signal-to-Noise Ratio In A Distributed Radar System," Proceedings of the IEEE International Conference on Systems of Systems Engineering, Los Angeles, CA., April 24 – 25, 2006.
- RC33 J-C Chen, D. C. Jenn and P. E. Pace, "Virtual Resolution RSNS DF Interferometry Using Fixed Element Spacings," Proceedings of the Southwest Research Institute Symposium on Radio Direction Finding, San Antonio Texas, May 2 – 3, 2006.
- RC34 B. L. Luke and P. E. Pace, "N-Channel RSNS Redundancy Analysis," Proceedings of the IEEE International Symposium on Information Theory, IT06-1373, Seattle, WA, July 9 – 14, 2006.
- RC35 E. Zilberman and P. E. Pace, "Autonomous Cropping and Feature Extraction Using Time-Frequency Marginal Distributions for LPI Radar Classification," Proceedings of the Eighth IASTED International Conference on Signal and Image Processing, Honolulu, Hawaii, August 14 - 16, 2006.
- RC36 P. E. Pace, "Low probability of intercept radar emitters: Emitter design and non-cooperative methods of detection and classification," Invited Paper, Proceedings of the International Airborne EW & SEAD Symposium, London, UK, 12 – 13 Sept. 2006.
- RC37 E. Zilberman and P. E. Pace, "Autonomous Time-Frequency Morphological Feature Extraction Algorithm for LPI Radar Modulation," Proceedings of the IEEE International Conference on Image Processing, paper 1673 Atlanta, GA., Oct. 8 – 11, 2006.
- RC38 T. O. Gulum and P. E. Pace, "Extraction Of Polyphase Radar Modulation Parameters Using A Wigner-Ville Distribution – Radon Transform," IEEE International Conference on Acoustics Speech and Signal Processing, Las Vegas, NV, March 30 – April 4, 2008.
- RC39 Gerald L. Fudge, Mark A. Chivers, Sujit Ravindran, Ross E. Bland, Phillip E. Pace "A Reconfigurable Direct RF Receiver Architecture," IEEE International Symposium on Circuits and Systems, Seattle, WA 18 – 21 May, 2008
- RC40 B-Y Liu, P. E. Pace and J. B. Knorr, "HF skywave FMCW OTH-B expected emitter footprint," IEEE International Conference on System of Systems Engineering, Monterey, CA 2 – 4 June, 2008.

- RC41 Y-Q Chen and P. E. Pace, "Network-enabled radar system simulation to assess the value of jamming in a general radar topology," IEEE International Conference on System of Systems Engineering, Monterey, CA 2 – 4 June, 2008.
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