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## Education

Ph.D. in Applied Physics, Stanford University, 1994

M.S. in Applied Physics, Stanford University, 1990

B.S. in Physics, Rensselaer Polytechnic Institute 1987

## Ph.D. Dissertation

*A Gyroscope Clock for a Null Gravitational Redshift Experiment*

Dissertation Readers: John Turneaure, C. W. Francis Everitt, and Robert Byer.

Abstract: Investigated the use of cryogenic, electrostatically-levitated, mechanical gyroscopes for use as a test for one of the founding principles of all metric theories of general relativity: the Einstein Equivalence Principle.

## Academic Appointments

1997-Present: Senior Research Engineer, Dept. Aeronautics & Astronautics, Stanford University  
Director of the GPS Laboratory, oversight of professional staff and graduate students, coordination of research efforts, identification and proposal of new research activities, advisor to the FAA

1993-1997: Research Engineer, Dept. Aeronautics & Astronautics, Stanford University  
Developed prototype of the Wide Area Augmentation System (WAAS), proving its feasibility to the FAA leading to their pursuing and implementing this multi-billion dollar project.

1987-1993: Research Assistant, Dept of Applied Physics, Stanford University  
In charge of developing the clock co-experiment on Gravity Probe-B to test the Einstein Equivalence Principle.

## Honors

- H-1 **Best Presentation of Session Award** (2018-1997) from the Institute of Navigation for 16 different papers presented at their annual GNSS conference.
- H-2 **Leadership Award** (2015), signals category winner by GPS World Magazine.
- H-3 **Distinguished Service Award** (2013) from the Institute of Navigation.
- H-4 **Kepler Award** (2010) for sustained and significant contributions to the development of satellite navigation, from the Institute of Navigation.
- H-5 **GNSS Leaders to Watch** (2009) by GPS World Magazine.
- H-6 **Thurlow Award** (2008) for outstanding contributions to the science of navigation, from the Institute of Navigation.
- H-7 **Fellow of the Institute of Navigation** (2006).
- H-8 **Early Achievement Award** (2000) from the Institute of Navigation.
- H-9 **Certificate of Appreciation** (1999) from RTCA for development of WAAS MOPS

H-10 **De-Yu Pan Award** (1993) for excellence in precision technology, from Hansen Experimental Physics Laboratory, Stanford University.

### Dissertations Co-Supervised

- PhD-1 Reid, Tyler, “Orbital Diversity for Global Navigation Satellite Systems,” May 2017.
- PhD-2 McMilin, Emily, “Single Antenna Null-Steering for GPS & GNSS Aerial Applications,” March 2016.
- PhD-3 Wong, Gabriel, “Impact of Nominal Signal Deformations on Satellite Navigation Systems,” June 2014.
- PhD-4 Heng, Liang, “Safe Satellite Navigation with Multiple Constellations: Global Monitoring of GPS and GLONASS Signal-In-Space Anomalies,” December 2012.
- PhD-5 Seo, Jiwon, “Overcoming Ionospheric Scintillation for Worldwide GPS Aviation,” June 2010.
- PhD-6 Chiou, Tsung-Yu, “Design of a Doppler-Aided GPS Navigation System for Weak Signals Caused By Strong Ionospheric Scintillation,” May 2010.
- PhD-7 Ene, Alexandru, “Utilization of Modernized Global Navigation Satellite Systems for Aircraft-Based Navigation Integrity,” March 2009.
- PhD-8 Gao, Grace Xingxin, “Towards Navigation based on 120 Satellites: Analyzing the New Signals,” September 2008.
- PhD-9 Datta-Barua, Seebany, “Ionospheric Threats to the Integrity of Airborne GPS users,” December 2007.
- PhD-10 Blanch, Juan, “Using Kriging to bound Satellite Ranging Errors due to the Ionosphere,” December 2003.
- PhD-11 Jan, Shau-Shiun, “Aircraft Landing Using a Modernized Global Positioning System and the Wide Area Augmentation System,” May 2003.
- PhD-12 Lo, Sherman, “Broadcasting GPS Integrity Information Using Loran-C,” July 2002.
- PhD-13 Hansen, Andrew, “Tomographic Estimation of the Ionosphere Using Terrestrial GPS Sensors,” March 2002.
- PhD-14 Dai, Donghai, “Interoperability of Space Based Augmentation Systems for Aircraft Navigation,” April 2001.
- PhD-15 Fuller, Richard, “Aviation Utilization of Geostationary Satellites for the Augmentation to GPS: Ranging and Data Link,” May 2000.
- PhD-16 Tsai, Yeou-Jyh, “Wide Area Differential Operation of the Global Positioning System: Ephemeris and Clock Operations,” August 1999.
- PhD-17 Chao, Yi-Chung, “Real Time Implementation of the Wide Area Augmentation System for the Global Positioning System with an Emphasis on Ionospheric Modeling,” June 1997.

### Peer-Reviewed Journal Papers

- J-1 Walter, Todd, Gunning, Kazuma, Phelts, R. Eric, and Blanch, Juan, “Validation of the Unfaulted Error Bounds for ARAIM,” *NAVIGATION*, DOI 10.1002/navi.214, Vol. 65, No. 1, pp. 117-133, Spring 2018.
- J-2 Blanch, Juan, Walter, Todd, Enge, Per, “Protection Levels after Fault Exclusion for Advanced RAIM,” *NAVIGATION*, Vol. 64, No. 4, pp. 505-514, DOI 10.1002/navi.210, Winter 2017.
- J-3 Walter, Todd and Blanch, Juan, “Improved User Positioning Monitor for WAAS,” *NAVIGATION*, Vol. 64, No. 1, pp. 165-175, DOI 10.1002/navi.180, Spring 2017.

- J-4 Blanch, Juan, Walter, Todd, Enge, Per, “Theoretical Results on the Optimal Detection Statistics for Autonomous Integrity Monitoring,” *NAVIGATION*, Vol. 64, No. 1, pp. 123-137, DOI 10.1002/navi.175, Spring 2017.
- J-5 Reid, Tyler G. R., Walter, Todd, Blanch, Juan A., and Enge, Per K., “GNSS Integrity in the Arctic,” *NAVIGATION*, Vol. 63, No. 3, pp. 467-490, DOI 10.1002/navi.169, Winter 2016.
- J-6 Reid, Tyler G. R., Walter, Todd, Enge, Per K., and Sakai, T., “Orbital Representations for the Next Generation of Satellite-based Augmentation Systems,” *GPS Solutions*, Volume 20, Issue 4, pp. 737–750 doi:10.1007/s10291-015-0485-x, October 2016.
- J-7 Bang, Eugene, Lee, Jinsil, Walter, Todd, and Lee, Jiyun, “Preliminary Availability Assessment to Support Single-Frequency SBAS Development in the Korean Region,” *GPS Solutions*, Volume 20, Issue 3, pp. 299-312 doi:10.1007/s10291-016-0522-4, July 2016.
- J-8 Blanch, Juan A., Walter, Todd, Enge, Per K., and Kropp, V., “A Simple Position Estimator that Improves Advanced RAIM Performance,” *IEEE Transactions on Aerospace and Electronic Systems*, Vol. 51, No. 3, July 2015.
- J-9 Blanch, Juan A., Walter, Todd, Enge, Per K., Lee, Y., Pervan, Boris S., Rippl, M., Spletter, A., and Kropp, V., “Baseline Advanced RAIM User Algorithm and Possible Improvements,” *IEEE Transactions on Aerospace and Electronic Systems*, Volume 51, No. 1, January 2015.
- J-10 Seo, Jiwon and Walter, Todd, “Future Dual-Frequency GPS Navigation System for Intelligent Air Transportation Under Strong Ionospheric Scintillation,” *IEEE Transactions on Intelligent Transportation Systems*, Volume 15, Issue 5, pp. 2224-2236, April 2014.
- J-11 Datta Baura, S., Walter, T., Bust, G., and Wanner, B., “Effects of Solar Cycle 24 Activity on WAAS Navigation,” *Space Weather*, Vol. 12, Issue 1, pp. 46–63, DOI: 10.1002/2013SW000982, January 2014.
- J-12 Enge, P., Enge, N., Walter, T., and Eldredge, L., “Aviation Benefits from Satellite Navigation,” *New Space*, Vol. 3, Issue 1, pp. 19-35, doi:10.1089/space.2014.0011, March 2015.
- J-13 Blanch, Juan A., Walter, Todd, and Enge, Per K., “Optimal Positioning for Advanced RAIM,” *NAVIGATION*, Vol. 60, No. 4, pp. 279-290, Winter 2013.
- J-14 Blanch, J., Walter, T., Enge, P., Wallner, S., Fernandez, F., Dellago, R., Ioannides, R., Pervan, Boris S., Hernandez, I., Belabbas, B., Spletter, A., and Rippl, M., “Critical Elements for Multi-Constellation Advanced RAIM for Vertical Guidance,” *NAVIGATION*, Vol. 60, No. 1, pp. 53-69, Spring 2013.
- J-15 Walter, Todd, Blanch, Juan, Phelts, R. Eric, and Enge, Per, “Evolving WAAS to Serve L1/L5 Users,” *NAVIGATION*, Vol. 59, No. 4, pp. 317-327, DOI 10.1002/navi.21, Winter 2012.
- J-16 Heng, Liang, Gao, Grace Xingxin, Walter, Todd, and Enge, Per K., “GPS Signal-in-Space Integrity Performance Evolution in the Last Decade: Data Mining 400,000,000 Navigation Messages from a Global Network of 400 Receivers,” *IEEE Transactions on Aerospace and Electronic Systems*, Vol. 48, No. 4, October 2012.
- J-17 Blanch, Juan A., Walter, Todd, and Enge, Per K., “Satellite Navigation for Aviation in 2025,” *Proceedings of the IEEE*, Vol. 100, Special Centennial Issue, pp.1821-30, 2012.

- J-18 Seo, Jiwon, Walter, Todd, and Enge, Per K., "Correlation of GPS Signal Fades Due to Ionospheric Scintillation for Aviation Applications," *Advances in Space Research*, No. 47, pp. 1777-88, July 2011.
- J-19 Seo, Jiwon, Walter, Todd, and Enge, Per K., "Availability Impact on GPS Aviation due to Strong Ionospheric Scintillation," *IEEE Transactions on Aerospace and Electronic Systems*, Vol. 47, No. 3, July 2011.
- J-20 Blanch, Juan A., Walter, Todd, and Enge, Per K., "RAIM with Optimal Integrity and Continuity Allocations Under Multiple Failures," *IEEE Transactions on Aerospace and Electronic Systems*, Vol. 46, No. 3, July 2010, pp. 1235-47.
- J-21 Walter, Todd, Blanch, Juan A., and Enge, Per K., "Evaluation of Signal in Space Error Bounds to Support Aviation Integrity," *NAVIGATION*, Vol. 57, No 2, pp. 101-113, Summer 2010.
- J-22 Kim, Euiho, Walter, Todd, and Enge Per K., "Unaugmented GPS-Based Flight Inspection System," *IEEE Transactions on Aerospace and Electronics Systems*, Vol. 46, No. 2, April 2010.
- J-23 Gao, Grace Xingxin, Chen, Alan, Lo, Sherman C., De Lorenzo, David S., Walter, Todd, and Enge, Per K., "Compass-M1 Broadcast Codes in E2, E5b, and E6 Frequency Bands," *IEEE Journal of Selected Topics in Signal Processing*, Vol. 3., No. 4, pp. 599-612, 2009.
- J-24 Jan, Shau-Shiun, Chan, Wyant, and Walter, Todd, "MATLAB Algorithm Availability Simulation Tool," *GPS Solutions*, Vol. 13, No. 4, September 2009.
- J-25 Seo, Jiwon, Walter, Todd, Chiou, Tsung-Yu, and Enge, Per K., "Characteristics of Deep GPS Signal Fading Due to Ionospheric Scintillation for Aviation Receiver Design," *AGU Electronic Journal, Radio Science*, 2009.
- J-26 Walter, Todd, Enge, Per K., Blanch, Juan A., and Pervan, Boris S., "Worldwide Vertical Guidance of Aircraft Based on Modernized GPS and New Integrity Augmentations," *Proceedings of the IEEE*, Vol. 96, No. 12, December 2008.
- J-27 Datta-Barua, S, Mannucci, A.J., Walter, Todd, and Enge, P., "Altitudinal Variation of Midlatitude Localized TEC Enhancement from Ground- and Space-based Measurements," *Space Weather*, Vol. 6, S10D06, October 2008.
- J-28 Datta-Barua, Seebany, Walter, Todd, Blanch, Juan A., and Enge, Per K., "Bounding Higher-Order Ionosphere Errors for the Dual-Frequency GPS User," *Radio Science*, Vol. 43, RS5010, October 2008.
- J-29 Blanch, Juan A., Walter, Todd, and Enge, Per K., "Position Error Bound Calculation for GNSS using Measurement Residuals," *IEEE Transactions on Aerospace and Electronic Systems*, Vol. 44, No. 3, July 2008.
- J-30 Jan, Shau-Shiun, Gebre-Egziabher, Demoz, Walter, Todd, and Enge, Per K., "Improving GPS-Based Landing System Performance using an Empirical Barometric Altimeter Confidence Bound," *IEEE Transactions on Aerospace and Electronic Systems*, Vol. 44, No. 1, January 2008.
- J-31 Walter, Todd and Powell, J. David, "Satellite-Based Approaches Facilitate More Efficient Inspection Process," *ICAO Journal*, Vol. 61, No. 2, March/April 2006.
- J-32 Blanch, Juan, Walter, Todd, and Enge, Per K., "Ionospheric Threat Model Methodology for WAAS," *NAVIGATION*, Vol. 49, No. 2, pp. 103-107, DOI 10.1002/j.2161-4296.2002.tb00259.x, Summer 2002.

- J-33 Walter, Todd, Hansen, Andrew, Blanch, Juan, Enge, Per, Mannucci, Tony, Pi, Xiaoping, Sparks, Larry, Iijima, Byron, El-Arini, Bakry, Lejeune, Roland, Hagen, Mine, Altshuler, Eric, Fries, Rob, and Chu, Aleck, "Robust Detection of Ionospheric Irregularities," *NAVIGATION*, Vol. 47, No. 2, pp. 89-100, DOI 10.1002/j.2161-4296.2001.tb00231.x, Summer 2001.
- J-34 Nichols, Jonathan, Hansen, Andrew, Walter, Todd, and Enge, Per, "High-Latitude Measurements of Ionospheric Scintillation Using the NSTB," *NAVIGATION*, Vol. 47, No. 2, pp. 112-120, DOI 10.1002/j.2161-4296.2000.tb00206.x, Summer 2000.
- J-35 Breivik, K., Forssell, B., Kee, C., Enge, P., and Walter, T., "Estimation of Multipath Error in GPS Pseudorange Measurements," *NAVIGATION*, Vol. 44, No. 1, pp. 43-52, DOI 10.1002/j.2161-4296.1997.tb01938.x, Spring 1997.
- J-36 Kee, Changdon, Walter, Todd, Enge, Per, and Parkinson, Bradford, "Quality Control Algorithms on WAAS Wide-Area Reference Stations," *NAVIGATION*, Vol. 44, No. 1, pp. 53-62, DOI 10.1002/j.2161-4296.1997.tb01939.x, Spring 1997.
- J-37 Enge, Per K., Walter, Todd, Pullen, Sam, Kee, Changdon, Chao, Yi-Chung, and Tsai, Yeou-Jyh, "Wide Area Augmentation of the Global Positioning System," *Proceedings of the IEEE*, Vol. 84, No 8, pp.1063-1088, DOI: 10.1109/5.533954, 1996.
- J-38 Walter, T., "Characterization of Frequency Stability: A Continuous Power Law Model with Discrete Sampling," in the *IEEE Transactions on Instruments and Measurements*, Vol. 43, No. 1, February 1994.
- J-39 Walter, T., Turneure, J.P., Buchman, S., Everitt, C. W. F. and Keiser, G. M., "An Ultra High Vacuum, Low Temperature Gyroscope Clock," in *Physica B*, 1990.

### Patents Awarded

- P-1 F. Bauregger, T. Walter, D. Akos and P. Enge, "Dual-Element Micro-strip Patch Antenna for Mitigating Radio Frequency Interference," U.S. Patent 6,930,639, Issued August 16, 2005, Assigned to Stanford University
- P-2 P. Enge, T. Walter and Y.C. Chao, "Wide Area Differential GPS Reference System and Method," U.S. Patent No. 5,621,646, April 15, 1997, Assigned to Stanford University

### Book Chapters

- B-1 Hegarty, Chris, Leva, Joe, Van Dyke, Karen, and Walter, Todd, "Chapter 11: Performance of Stand-Alone GNSS," *Understanding GPS/GNSS: Principles and Applications, Third Edition*, Artech House, ISBN: 9781630810580, 2017.
- B-2 Bisnath, S., Uijt de Haag, M., Diggle, D. W., Hegarty, C., Milbert, D., and Walter, T., "Chapter 12: Differential GNSS and Precise Point Positioning," *Understanding GPS/GNSS: Principles and Applications, Third Edition*, Artech House, ISBN: 9781630810580, 2017.
- B-3 Walter, Todd, "Chapter 12: Satellite Based Augmentation Systems," *Springer Handbook of Global Navigation Satellite Systems*, Springer International Publishing Switzerland, DOI: 10.1007/978-3-319-42928-1, 2017.
- B-4 Walter, Todd, "Integrity Lessons from the WAAS Integrity Performance Panel," *Global Navigation Satellite Systems: Report of a Joint Workshop of the National Academy of Engineering and the Chinese Academy of Engineering*, National Academies Press, Washington DC, ISBN-13: 978-0-309-22275-4, 2012.

- B-5 Walter, Todd and El-Arini, Bakry, Eds., *ION GPS Redbook Volume VI, Selected Papers on Satellite Based Augmentation Systems (SBASs)*, The Institute of Navigation, Alexandria, VA, 1999.

### Conference Papers

- C-1 Gunning, Kazuma, Blanch, Juan, Walter, Todd, de Groot, Lance, and Norman, Laura, “Design and Evaluation of Integrity Algorithms for PPP in Kinematic Applications,” in Proceedings of the 31st International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS+ 2018), Miami, Florida, September 2018.
- C-2 Hegarty, Christopher , Odeh, Ali, Shallberg, Karl, Wesson, Kyle, Walter, Todd, and Alexander, Ken, “Spoofing Detection for Airborne GNSS Equipment,” in Proceedings of the 31st International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS+ 2018), Miami, Florida, September 2018.
- C-3 Neish, Andrew, Walter, Todd, Enge, Per, “Parameter Selection for the TESLA Keychain,” in Proceedings of the 31st International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+ 2018), Miami, Florida, September 2018.
- C-4 Phelts, R. Eric, Blanch, Juan, Gunning, Kazuma, Walter, Todd, and Enge, Per, “Effect of Aircraft Banking on ARAIM Performance,” in Proceedings of the 31st International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS+ 2018), Miami, Florida, September 2018.
- C-5 Walter, Todd, Blanch, Juan, de Groot, Lance, Norman, Laura, and Joerger, Mathieu, “Ionospheric Rates of Change,” in Proceedings of the 31st International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS+ 2018), Miami, Florida, September 2018.
- C-6 Blanch, Juan, Walter, Todd, and Enge, Per, “A Formula for Solution Separation without Subset Solutions for Advanced RAIM,” in Proceedings of the IEEE/ION Position Location and Navigation Symposium (PLANS), Monterey, California, April 2018.
- C-7 Zhang, Shiwen, Lo, Sherman, Chen, Yu-Hsuan, Walter, Todd, and Enge, Per, “GNSS Multipath Detection in Urban Environment Using 3D Building Model,” in Proceedings of the IEEE/ION Position Location and Navigation Symposium (PLANS), Monterey, California, April 2018.
- C-8 Blanch, Juan, Walter, Todd, and Enge, Per, “Fixed Subset Selection to Reduce Advanced RAIM Complexity,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, Reston, Virginia, January 2018.
- C-9 Garbin-Manfredini, Esteban, Akos, Dennis M., Chen, Yu-Hsuan, Lo, Sherman, Walter, Todd, and Enge, Per, “Effective GPS Spoofing Detection Utilizing Metrics from Commercial Receivers,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, Reston, Virginia, January 2018.
- C-10 Neish, Andrew, Walter, Todd, and Enge, Per, “Quantum Resistant Authentication Algorithms for Satellite-Based Augmentation Systems,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, Reston, Virginia, January 2018.

- C-11 Walter, Todd, Shallberg, Karl, Altshuler, Eric, Wanner, William, Harris, Chris, and Stimmler, Robert, “WAAS at 15,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, Reston, Virginia, January 2018.
- C-12 Blanch, Juan, Walter, Todd, and Enge, Per, “A Method to Determine Strict Gaussian Bounds of a Sample Distribution,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems (GNSS+) Conference, Portland, Oregon, September 2017.
- C-13 Gunning, Kazuma, Walter, Todd, Enge, Per, “Multi-GNSS Constellation Anomaly Detection and Performance Monitoring,” in Proceedings of the 30th International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS+ 2017), Portland, Oregon, pp. 1051-1062, September 2017.
- C-14 Kuusniemi, Heidi, Blanch, Juan, Chen, Yu-Hsuan, Lo, Sherman, Innac, Anna, Ferrara, Giorgia, Honkala, Salomon, Bhuiyan, M. Zahidul H., Thombre, Sarang, Söderholm, Stefan, Walter, Todd, Phelts, R. Eric, Enge, Per K., “Feasibility of Fault Exclusion Related to Advanced RAIM for GNSS Spoofing Detection,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems (GNSS+) Conference, Portland, Oregon, September 2017.
- C-15 Lo, Sherman, Chen, Yu Hsuan, Reid, Tyler, Perkins, Adrien, Walter, Todd, and Enge, Per, “The Benefit of Low Cost Accelerometers for GNSS Anti-Spoofing,” in Proceedings of The Institute of Navigation (ION) Positioning, Navigation and Timing Conference, Honolulu, Hawaii, May 2017.
- C-16 Phelts, R. Eric, Shallberg, Karl, Walter, Todd, and Enge, Per, “WAAS Signal Deformation Monitor Performance: Beyond the ICAO Threat Model,” in Proceedings of The Institute of Navigation (ION) Positioning, Navigation and Timing Conference, Honolulu, Hawaii, May 2017.
- C-17 Walter, Todd, Gunning, Kazuma, Phelts, R. Eric, and Blanch, Juan, “Validation of the Unfaulted Error Bounds for ARAIM,” in Proceedings of The Institute of Navigation (ION) Positioning, Navigation and Timing Conference, Honolulu, Hawaii, May 2017.
- C-18 Gunning, Kazuma, Walter, Todd, and Enge, Per, “Characterization of GLONASS Broadcast Clock and Ephemeris: Nominal Performance and Fault Trends for ARAIM,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, Monterey, California, January 2017.
- C-19 Shallberg, Karl W., Ericson, Swen D., Phelts, Eric, Walter, Todd, Kovach, Karl, and Altshuler, Eric, Catalog and Description of GPS and WAAS L1 C/A Signal Deformation Events,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, Monterey, California, pp. 508-520, January 2017.
- C-20 Blanch, Juan, Chen, Yu-Hsuan, Phelts, R. Eric, Walter, Todd, and Enge, Per, “Mitigation of Short Duration Satellite Outages for Advanced RAIM and other Integrity Systems Based on GNSS,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems (GNSS+) Conference, Portland, Oregon, September 2016.

- C-21 Phelts, R. Eric, Blanch, Juan, Chen, Yu-Hsuan, Enge, Per, and Riley, Stuart, “ARAIM in Flight Using GPS and GLONASS: Initial Results from a Real-time Implementation,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems (GNSS+) Conference, Portland, Oregon, September 2016.
- C-22 Walter, Todd, Blanch, Juan, and Kropp, Victoria, “Satellite Selection for Multi-Constellation SBAS,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems (GNSS+) Conference, Portland, Oregon, September 2016.
- C-23 Walter, Todd, Blanch, Juan, Joerger, Mathieu, and Pervan, Boris S., “Determination of Fault Probabilities for ARAIM,” in Proceedings of the IEEE/ION Position Location and Navigation Symposium (PLANS), Savannah, Georgia, April 2016.
- C-24 Blanch, Juan, Walter, Todd, and Enge, Per K., “A Simple Satellite Exclusion Algorithm for Advanced RAIM,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, Monterey, California, January 2016.
- C-25 Chen, Yu-Hsuan, Perkins, Adrien L. H., Lo, Sherman C., Akos, Dennis M., Blanch, Juan A., Walter, Todd, and Enge, Per K., “Demonstrating ARAIM on UAS using Software Defined Radio and Civilian Signal GPS L1/L2C and GLONASS G1/G2,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, Monterey, California, January 2016.
- C-26 Walter, Todd, Gunning, Kazuma, and Blanch, Juan, “Improved Ephemeris Monitoring for GNSS,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, Monterey, California, January 2016.
- C-27 Walter, Todd and Blanch, Juan, “Improved User Position Monitor for WAAS,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, Monterey, California, January 2016.
- C-28 Blanch, Juan A., Walter, Todd, Enge, Per K., Pervan, Boris, Joerger, Mathieu, Khanafseh, S., Burns, J., Alexander, K., Boyero, J. P., Lee, Y., Kropp, V., Macabiau, C., Suard, N., Berz, G., Rippl, M., Martini, I., and Perea, S., “Progress on Working Group-C Activities on Advanced RAIM,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems (GNSS+) Conference, Tampa, Florida, September 2015.
- C-29 Reid, Tyler G. R., Walter, Todd, Blanch, Juan A., and Enge, Per K., “GNSS Integrity in the Arctic,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems (GNSS+) Conference, Tampa, Florida, September 2015.
- C-30 McMilin, Emily B., Chen, Yu-Hsuan, De Lorenzo, David S., Lo, Sherman C., Akos, Dennis M., and Enge, Per K., “GPS Anti-Jam: A Simple Method of Single Antenna Null-Steering for Aerial Applications,” in Proceedings of The Institute of Navigation (ION) Positioning, Navigation and Timing Conference, Honolulu, Hawaii, April 2015.
- C-31 Phelts, R. Eric, Altshuler, Eric, Walter, Todd, and Enge, Per K., “Validating Nominal Bias Error Limits Using 4 years of WAAS Signal Quality Monitoring Data,” in Proceedings of The Institute of Navigation (ION) Positioning, Navigation and Timing Conference, Honolulu, Hawaii, April 2015.



- C-32 Walter, Todd and Blanch, Juan, “Characterization of GPS Clock and Ephemeris Errors to Support ARAIM,” in Proceedings of The Institute of Navigation (ION) Positioning, Navigation and Timing Conference, Honolulu, Hawaii, April 2015.
- C-33 Blanch, Juan A., Walter, Todd, and Enge, Per K., “Fast Multiple Fault Exclusion with a Large Number of Measurements,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, Dana Point, California, January 2015.
- C-34 Walter, Todd and Blanch, Juan, “Airborne Mitigation Of Constellation Wide Faults,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, Dana Point, California, January 2015.
- C-35 Blanch, Juan A., Walter, Todd, Enge, Per K., Stern, Abe, and Altshuler, Eric, “Evaluation of a Covariance-based Clock and Ephemeris Error Bounding Algorithm for SBAS,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems (GNSS+) Conference, Tampa, Florida, September 2014.
- C-36 Blanch, Juan A., Walter, Todd, Enge, Per K., Pervan, Boris S., Joerger, Mathieu, Khanafseh, Samer, Burns, Jason, Alexander, Ken, Boyero, Juan Pablo, Lee, Young, Kropp, Victoria, Milner, Carl, Macabiau, Christophe, Suard, Norbert, Berz, Gerhard, and Rippl, Markus, “Architectures for Advanced RAIM: Offline and Online,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems (GNSS+) Conference, Tampa, Florida, September 2014.
- C-37 McMilin, Emily B., De Lorenzo, David S., Walter, Todd, Lee, Thomas H., and Enge, Per K., “Single Antenna GPS Spoof Detection that is Simple, Static, Instantaneous and Backwards Compatible for Aerial Applications,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems (GNSS+) Conference, Tampa, Florida, September 2014.
- C-38 Reid, Tyler G. R., Walter, Todd, Enge, Per K., and Fowler, Ananda, “Crowdsourcing Arctic Navigation Using Multispectral Ice Classification & GNSS,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems (GNSS+) Conference, Tampa, Florida, September 2014.
- C-39 Wong, Gabriel H. W., Chen, Yu-Hsuan, Phelts, R. Eric, Walter, Todd, and Enge, Per K., “Mitigation of Nominal Signal Deformations on Dual-Frequency WAAS Position Errors,” in Proceedings of the 27th International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS+ 2014), Tampa, Florida, pp. 3129-3147, September 2014.
- C-40 Blanch, Juan A., Walter, Todd, and Enge, Per K., “Exclusion for Advanced RAIM: Requirements and a Baseline Algorithm,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, San Diego, California, January 2014.
- C-41 Chen, Yu-Hsuan, Lo, Sherman C., Akos, Dennis M., Choi, Myungjun, Blanch, Juan A., Walter, Todd, and Enge, Per K., “Development of a Real-time GNSS Software Receiver for Evaluating RAIM in Multi-constellation,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, San Diego, California, January 2014.

- C-42 Phelts, R. Eric, Blanch, Juan A., Walter, Todd, and Enge, Per K., “The Effect of Nominal Signal Deformations on ARAIM User Performance,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, San Diego, California, January 2014.
- C-43 Walter, Todd, Blanch, Juan A., and Enge, Per K., “Reduced Subset Analysis for Multi-Constellation ARAIM,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, San Diego, California, January 2014.
- C-44 Blanch, Juan A., Walter, Todd, and Enge, Per K., “Advanced RAIM System Architecture with a Long Latency Integrity Support Message,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems (GNSS) Conference, Nashville, Tennessee, September 2013.
- C-45 Reid, Tyler G. R., Walter, Todd, and Enge, Per K., “Qualifying an L5 SBAS MOPS Ephemeris Message to Support Multiple Orbit Classes,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Nashville, Tennessee, September 2013.
- C-46 Walter, Todd, Blanch, Juan A., and Enge, Per K., “Implementation of the L5 SBAS MOPS,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Nashville, Tennessee, September 2013.
- C-47 Bang, Eugene, Lee, Jinsil, Lee, Jiyun, Seo, Jiwon, and Walter, Todd, “Constructing Ionospheric Irregularity Threat Model for Korean SBAS,” in Proceedings of The Institute of Navigation (ION) Pacific PNT Meeting in Honolulu, Hawaii, April 2013.
- C-48 Blanch, Juan A., Walter, Todd, and Enge, Per K., “Results on the Optimal Detection Statistic for Integrity Monitoring,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, San Diego, California, January 2013.
- C-49 Blanch, Juan A., Walter, Todd, Phelts, R. Eric, and Enge, Per K., “Near Term Improvements to WAAS Availability,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, San Diego, California, January 2013.
- C-50 Phelts, R. Eric, Wong, Gabriel H. W., Walter, Todd, and Enge, Per K., “Signal Deformation Monitoring for Dual-Frequency WAAS,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, San Diego, California, January 2013.
- C-51 Reid, Tyler G. R., Walter, Todd, and Enge, Per K., “L1/L5 SBAS MOPS Ephemeris Message to Support Multiple Orbit Classes,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, San Diego, California, January 2013.
- C-52 Walter, Todd, Blanch, Juan A., Choi, Myungjun, Reid, Tyler G. R., and Enge, Per K., “Incorporating GLONASS into Aviation RAIM Receivers,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, San Diego, California, January 2013.
- C-53 Azoulai, Laurent, Neri, Pierre, Milner, Carl, Macabiau, Christophe, and Walter, Todd, “SBAS Error Modeling for Category I Autoland,” in Proceedings of The Institute of

- Navigation (ION) Global Navigation Satellite Systems Conference, Nashville, Tennessee, September 2012.
- C-54 Blanch, Juan A., Walter, Todd, Enge, Per K., Lee, Young, Pervan, Boris S., Rippl, Markus, and Spletter, Alex, “Advanced RAIM User Algorithm Description: Integrity Support Message Processing, Fault Detection, Exclusion, and Protection Level Calculation,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Nashville, Tennessee, September 2012.
- C-55 Choi, Myungjun, Blanch, Juan A., Walter, Todd, Akos, Dennis M., Enge, Per K., “Evaluation of Multi-constellation Advanced RAIM for Vertical Guidance Using GPS and GLONASS Signals with Multiple Faults,” in Proceedings of the 25th International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS 2012), 17 - 21, Nashville, Tennessee, September 2012.
- C-56 Gao, Grace Xingxin, Gunning, Kazuma, Walter, Todd, and Enge, Per K., “Impact of Personal Privacy Devices for WAAS Aviation Users,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Nashville, Tennessee, September 2012.
- C-57 Heng, Liang, Gao, Grace Xingxin, Walter, Todd, and Enge, Per K., “GLONASS Signal-in-Space Anomalies Since 2009,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Nashville, Tennessee, September 2012.
- C-58 Walter, Todd, Blanch, Juan A., and Enge, Per K., “A Framework for Analyzing Architectures that Support ARAIM,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Nashville, Tennessee, September 2012.
- C-59 Walter, Todd, Blanch, Juan A., and Enge, Per K., “L1/L5 SBAS MOPS to Support Multiple Constellations,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Nashville, Tennessee, September 2012.
- C-60 Wong, Gabriel H. W., Chen, Yu-Hsuan, Phelts, R. Eric, Walter, Todd, and Enge, Per K., “Measuring Code-Phase Differences Due to Inter-Satellite Hardware Differences,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Nashville, Tennessee, September 2012.
- C-61 Heng, Liang, Gao, Grace Xingxin, Walter, Todd, and Enge, Per K., “Automated Verification of Potential Signal-In-Space Anomalies Using Ground Observation Data,” in Proceedings of the IEEE/ION Position Location and Navigation Symposium (PLANS), Monterey, California, May 2012.
- C-62 Blanch, Juan A., Walter, Todd, and Enge, Per K., “Optimal Positioning for Advanced RAIM,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, Newport Beach, California, January 2012.
- C-63 Heng, Liang, Gao, Grace Xingxin, Walter, Todd, and Enge, Per K., “Statistical Characterization of GLONASS Broadcast Clock Errors and Signal-In-Space Errors,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, Newport Beach, California, January 2012.

- C-64 Blanch, Juan A., Walter, Todd, and Enge, Per K. “A Clock and Ephemeris Algorithm for Dual Frequency SBAS,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Portland, Oregon, September 2011.
- C-65 Blanch, Juan A., Walter, Todd, Enge, Per K., Waller, Stefan, Fernandez, Francisco, Dellago, Riccardo, Ioannides, Pervan, Boris S., Hernandez, Ignacio, Belabbas, Boubeker, Spletter, Alexandru, and Rippl, Markus, “A Proposal for Multi-Constellation Advanced RAIM for Vertical Guidance,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Portland, Oregon, September 2011.
- C-66 Choi, Myungjun, Blanch, Juan A., Akos, Dennis M., Heng, Liang, Gao, Grace Xingxin, Walter, Todd, and Enge, Per K., “Demonstrations of Multi-Constellation Advanced RAIM for Vertical Guidance Using GPS and GLONASS Signals,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Portland, Oregon, September 2011.
- C-67 Heng, Liang, Gao, Grace Xingxin, Walter, Todd, and Enge, Per K., “Statistical Characterization of GLONASS Broadcast Ephemeris Errors,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Portland, Oregon, September 2011.
- C-68 Thaelert, Steffen, Erker, Stefan, Furthner, Johann, and Meurer, Michael, Gao, Grace Xingxin, Heng, Liang, Walter, Todd, and Enge, Per, “First Signal in Space Analysis of GLONASS K-1,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Portland, Oregon, September 2011.
- C-69 Walter, Todd, Blanch, Juan A., Phelts, R. Eric, and Enge, Per K., “Evolving WAAS to Serve L1/L5 Users,” in Proceedings of the Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Portland, Oregon, September 2011.
- C-70 Wong, Gabriel H. W., Phelts, R. Eric, Walter, Todd, and Enge, Per K., “Bounding Errors Caused by Nominal GNSS Signal Deformations,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Portland, Oregon, September 2011.
- C-71 Blanch, Juan A., Walter, Todd, and Enge, Per K., “Optimization of a Vertical Protection Level Equation for Dual Frequency SBAS,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting in San Diego, California, January 2011.
- C-72 Choi, Myungjun, Blanch, Juan A., Walter, Todd, and Enge, Per K., “Advanced RAIM Demonstration using Four Months of Ground Data,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting in San Diego, California, January 2011.
- C-73 Heng, Liang, Gao, Grace Xingxin, Walter, Todd, and Enge, Per K., “Statistical Characterization of GPS Signal-In-Space Errors,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, San Diego, California, January 2011.

- C-74 Pullen, Samuel P., Walter, Todd, and Enge, Per K. “SBAS and GBAS Integrity for Non-Aviation Users: Moving Away from "Specific Risk",” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, San Diego, California, January 2011.
- C-75 Wong, Gabriel H. W., Phelts, R. Eric, Walter, Todd, and Enge, Per K., “Alternative Characterization of Analog Signal Deformation for GNSS-GPS Satellites,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, San Diego, California, January 2011.
- C-76 Blanch, Juan A., Choi, Myungjun, Walter, Todd, Enge, Per K., and Suzuki, Kazushi, “Prototyping Advanced RAIM for Vertical Guidance,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Portland, Oregon, September 2010.
- C-77 Gao, Grace Xingxin, Heng, Liang, Wong, Phelts, Eric, Gabriel, Blanch, Juan A., Walter, Todd, Enge, Per K., Erker, Stefan, and Thoenert, Steffen, “GPS in Mid-life with an International Team of Doctors: Analyzing IIF-1 Satellite Performance and Backward-Compatibility,” in Proceedings of the Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Portland, Oregon, September 2010.
- C-78 Heng, Liang, Gao, Grace Xingxin, Walter, Todd, and Enge, Per K., “GPS Signal-in-Space Anomalies in the Last Decade: Data Mining of 400,000,000 GPS Navigation Messages,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Portland, Oregon, September 2010.
- C-79 Pullen, Samuel P., Luo, Ming, Walter, Todd, and Enge, Per K., “Using SBAS to Enhance GBAS User Availability: Results and Extensions to Enhance Air Traffic Management.” in Proceedings of the ENRI International Workshop on ATM/CNS in Tokyo, Japan, September 2010.
- C-80 Walter, Todd, Blanch, Juan A., and Enge, Per K., “Vertical Protection Level Equations for Dual Frequency SBAS,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Portland, Oregon, September 2010.
- C-81 Wong, Gabriel H. W., Phelts, Eric, Walter, Todd, and Enge, Per K., “Characterization of Signal Deformations for GPS and WAAS Satellites,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Portland, Oregon, September 2010.
- C-82 Powell, J. David and Walter, Todd, “Space Weather: Its Effect on GNSS, DGNSS, SBAS, and Flight Inspection,” in Proceedings of the International Flight Inspection Symposium (IFIS), Beijing, China, June 2010.
- C-83 Heng, Liang, Gao, Grace Xingxin, Walter, Todd, and Enge, Per K., “GPS Ephemeris Error Screening and Results for 2006-2009,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, San Diego, California, January 2010.
- C-84 Walter, Todd, Blanch, Juan A., and Enge, Per K., “Coverage Improvement for Dual Frequency SBAS,” in Proceedings of The Institute of Navigation (ION) International Technical Meeting, San Diego, California, January 2010.

- C-85 Blanch, Juan A., Mayer, Christoph, Lo, Sherman C., Walter, Todd, and Enge, Per K., “Hysteresis in RAIM,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Savannah, Georgia, September 2009.
- C-86 Gao, Grace Xingxin, Tang, Haochen, Blanch, Juan A., Lee, Jiyun, Walter, Todd, and Enge, Per K. “Methodology and Case Studies of Signal-in-Space Error Calculation: Top-down Meets Bottom-up,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Savannah, Georgia, September 2009.
- C-87 Phelts, R. Eric, Walter, Todd, and Enge, Per K., “Characterizing Nominal Analog Signal Deformation on GNSS Signals,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Savannah, Georgia, September 2009.
- C-88 Seo, Jiwon, Walter, Todd, and Enge, Per K., “Availability Benefit of Future Dual Frequency GPS Avionics under Strong Ionospheric Scintillation,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Savannah, Georgia, September 2009.
- C-89 Tang, Haochen, Blanch, Juan A., Walter, Todd, and Enge, Per K., “Flight Test Data Validation of Dual-Frequency GPS Measurement Error Characteristics,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Savannah, Georgia, September 2009.
- C-90 Walter, Todd, Blanch, Juan A., and Enge, Per K., “Evaluation of Signal in Space Error Bounds to Support Aviation Integrity,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Savannah, Georgia, September 2009.
- C-91 Blanch, Juan A., Walter, Todd, and Enge, Per K., “A Simple Algorithm for Dual Frequency Ground Monitoring Compatible with ARAIM,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Savannah, Georgia, September 2008.
- C-92 Chiou, Tsung-Yu, Seo, Jiwon, Walter, Todd, and Enge, Per K., “Performance of a Doppler-Aided GPS Navigation System for Aviation Applications under Ionospheric Scintillation,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Savannah, Georgia, September 2008.
- C-93 Ramakrishnan, Shankar, Gao, Grace Xingxin, De Lorenzo, David S., Walter, Todd, Enge, Per K., and Akos, Dennis M., “Design and Analysis of Reconfigurable Embedded GNSS Receivers Using Model-Based Design Tools,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Savannah, Georgia, September 2008.
- C-94 Schroth, Georg, Rippl, Markus, Ene, Alexandru, Blanch, Juan A., Belabbas, Boubeker, Walter, Todd, Enge, Per K., and Meurer, Michael, “Enhancements of the Range Consensus Algorithm (RANCO),” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Savannah, Georgia, September 2008.
- C-95 Seo, Jiwon, Walter, Todd, Chiou, Tsung-Yu, Blanch, Juan A., and Enge, Per K., “Evaluation of Deep Signal Fading Effects Due to Ionospheric Scintillation on GPS

- Aviation Receivers,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Savannah, Georgia, September 2008.
- C-96 Kim, Euiho, Walter, Todd, and Powell, J. David, “GNSS-based Flight Inspection Systems,” in Proceedings of the International Flight Inspection Symposium, Oklahoma City, Oklahoma, June 2008.
- C-97 Seo, Jiwon, Walter, Todd, Chiou, Tsung-Yu, and Enge, Per K., “Characteristics of Deep GPS Signal Fading Due to Ionospheric Scintillation for Aviation Receiver Design,” in Proceedings of the 12th International Ionospheric Effects Symposium, Alexandria, Virginia, May 2008.
- C-98 Ene, Alexandru, Blanch, Juan A., Walter, Todd and Powell, J. David, “Validation of Multiple Hypothesis RAIM Algorithm using Dual-frequency GNSS Signals,” in Proceedings of the European Navigation Conference GNSS/ Toulouse Space Show, Toulouse, France, April 2008.
- C-99 Schroth, Georg, Ene, Alexandru, Blanch, Juan A., Walter, Todd and Enge, Per K., “Failure Detection and Exclusion via Range Consensus,” in Proceedings of the European Navigation Conference GNSS/ Toulouse Space Show, Toulouse, France, April 2008.
- C-100 Gao, Grace Xingxin, Chen, Alan, Lo, Sherman C., De Lorenzo, David S., Walter, Todd, and Enge, Per K., “Compass-M1 Broadcast Codes and Their Application to Acquisition and Tracking,” in Proceedings of The Institute of Navigation (ION) National Technical Meeting, San Diego, California, January 2008.
- C-101 Walter, Todd, Blanch, Juan A., Enge, Per K., Pervan, Boris S., and Gratton, Livio, “Future Architectures to Provide Aviation Integrity,” in Proceedings of The Institute of Navigation (ION) National Technical Meeting, San Diego, California, January 2008.
- C-102 Walter, Todd, Blanch, Juan A., and Enge, Per K., “L5 Satellite Based Augmentation Systems Protection Level Equations,” in Proceedings of the International Global Navigation Satellite Systems (IGNSS) Symposium, Sydney, Australia, December 2007.
- C-103 Blanch, Juan A., Ene, Alex, Walter, Todd, and Enge, Per K., “An Optimized Multiple Hypothesis RAIM Algorithm for Vertical Guidance,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Fort Worth, Texas, September 2007.
- C-104 Datta-Barua, Seebany, Walter, Todd, Pullen, Samuel P., and Enge, Per K., “Modeling the 20 November 2003 Ionosphere Storm with GRACE,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Fort Worth, Texas, September 2007.
- C-105 Seo, Jiwon, Walter, Todd, Marks, Edward, Chiou, Tsung-Yu, and Enge, Per K., “Ionospheric Scintillation Effects on GPS Receivers during Solar Minimum and Maximum,” in Proceedings of the International Beacon Satellite Symposium, Boston, Massachusetts, June 2007.
- C-106 Gao, Grace Xingxin, De Lorenzo, David S., Walter, Todd, and Enge, Per K., “Acquisition and Tracking of GIOVE-A Broadcast L1/E5/E6 Signals and Analysis of

- DME/TACAN Interference on Receiver Design,” in Proceedings of the European Navigation Conference GNSS/TimeNav 2007, Geneva, Switzerland, May 2007.
- C-107 Kim, Euiho, Walter, Todd, and Powell, J. David, “Standalone GPS-Based Flight Inspection System,” in Proceedings of the European Navigation Conference GNSS/TimeNav 2007, Geneva, Switzerland, May 2007.
- C-108 Gao, Grace Xingxin, Datta-Barua, Seebany, Walter, Todd, and Enge, Per K., “Ionosphere Effects for Wideband GNSS Signals,” in Proceedings of The Institute of Navigation (ION) Annual Meeting, Cambridge, Massachusetts, April 2007.
- C-109 Kim, Euiho, Walter, Todd, and Powell, J. David “WAAS-Based Flight Inspection System,” in Proceedings of The Institute of Navigation (ION) Annual Meeting, Cambridge, Massachusetts, April 2007.
- C-110 Blanch, Juan A., Walter, Todd, and Enge, Per K., “Understanding PHMI for Safety of life applications in GNSS,” in Proceedings of The Institute of Navigation National Technical Meeting, San Diego, California, January 2007.
- C-111 Chiou, Tsung-Yu, Walter, Todd, Gebre-Egziabher, Demoz, Akos, Dennis M., and Enge, Per K., “Model Analysis on the Performance of an Inertial Aided FLL-Assisted-PLL Carrier-Tracking Loop in the Presence of Ionospheric Scintillations,” in Proceedings of The Institute of Navigation (ION) National Technical Meeting, San Diego, California, January 2007.
- C-112 Gao, Grace Xingxin, De Lorenzo, David S., Lo, Sherman C., Akos, Dennis M., Chen, Alan, Walter, Todd, and Enge, Per K., “Galileo GIOVE-A Broadcast E5 Codes and their Application to Acquisition and Tracking,” in Proceedings of The Institute of Navigation (ION) National Technical Meeting, San Diego, California, January 2007.
- C-113 Kim, Euiho, Walter, Todd, and Powell, J. David, “Adaptive Carrier Smoothing using Code and Carrier Divergence,” in Proceedings of The Institute of Navigation (ION) National Technical Meeting, San Diego, California, January 2007.
- C-114 Datta-Barua, Seebany, Walter, Todd, Blanch, Juan A., and Enge, Per K., “Bounding Higher Order Ionosphere Errors for the Dual Frequency GPS User,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Fort Worth, Texas, September 2006.
- C-115 Gao, Grace Xingxin, Spilker, James J., Walter, Todd, Enge, Per K., and Pratt, Anthony, “Code Generation Scheme and Property Analysis of Broadcast Galileo L1 and E6 Signals,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Fort Worth, Texas, September 2006.
- C-116 Kim, Euiho, Walter, Todd, and Powell, J. David, “Optimizing WAAS Accuracy/Stability For a Single Frequency Receiver,” in Proceedings of The Institute of Navigation (ION) Global Navigation Satellite Systems Conference, Fort Worth, Texas, September 2006.
- C-117 Kim, Euiho, Walter, Todd, and Powell, J. David, “WAAS-Aided Flight Inspection Truth System,” in Proceedings of the 14th International Flight Inspection Symposium (IFIS), Toulouse, France, June 2006.



- C-118 Walter, Todd, and Powell, J. David, "Flight Inspection of GNSS SBAS Procedures," in Proceedings of the 14th International Flight Inspection Symposium (IFIS), Toulouse, France, June 2006.
- C-119 Kim, Euiho, Peled, Uri, Walter, Todd, and Powell, J. David, "A Development of WAAS-Aided Flight Inspection Truth System," in Proceedings of the IEEE/ION Position Location and Navigation Symposium, San Diego, California, April 2006.
- C-120 Rife, Jason H., Pullen, Samuel P., Walter, Todd, Phelts, R. Eric, Pervan, Boris S., and Enge, Per K., "WAAS-Based Threat Monitoring for a Local Airport Monitor (LAM) that Supports Category I Precision Approach," in Proceedings of the IEEE/ION Position Location and Navigation Symposium, San Diego, California, April 2006.
- C-121 Ene, Alexandru, Blanch, Juan A., and Walter, Todd, "Galileo-GPS RAIM for Vertical Guidance," in Proceedings of The Institute of Navigation's National Technical Meeting, Monterey, California, January 2006.
- C-122 Kim, Euiho, Walter, Todd, and Powell, J. David, "A Reference Point-based Precise Relative Positioning Method Using a Single Frequency Receiver," in Proceedings of The Institute of Navigation's National Technical Meeting, Monterey, California, January 2006.
- C-123 Seo, Jiwon, Rife, Jason H., Pullen, Samuel P., Walter, Todd, and Enge, Per K., "Field Data Analysis for a Range-Based Local Airport Monitor for WAAS," in Proceedings of The Institute of Navigation's National Technical Meeting, Monterey, California, January 2006.
- C-124 Luo, Ming, Pullen, Samuel P., Datta-Barua, Seebany, Zhang, Godwin, Walter, Todd, and Enge, Per K., "LAAS Study of Slow-Moving Ionosphere Anomalies and Their Potential Impacts," in Proceedings of The Institute of Navigation's GNSS Meeting, Long Beach, California, September 2005.
- C-125 Blanch, Juan A., Walter, Todd, and Enge, Per K., "Protection Level Calculation Using Measurement Residuals: Theory and Results," in Proceedings of The Institute of Navigation GNSS Conference, Long Beach, California, September 2005.
- C-126 Blanch, Juan A., Walter, Todd, and Enge, Per K., "Protection Level Calculation in the Presence of Heavy Tail Errors Using Measurement Residuals," in Proceedings of the European Navigation Conference GNSS 2005, Munich, Germany, July 2005.
- C-127 Walter, Todd, Pullen, Samuel P., Rife, Jason H., Seo, Jiwon, and Enge, Per K., "The Advantages of Local Monitoring and VHF Data Broadcast for SBAS," in Proceedings of the European Navigation Conference GNSS 2005, Munich, Germany, July 2005.
- C-128 Datta-Barua, Seeany, Walter, Todd, Konno, Hiroyuki, Blanch, Juan A., and Enge, Per K., "Verification of Low Latitude Ionosphere Effects on WAAS during October 2003 Geomagnetic Storm," in Proceedings of The Institute of Navigation's Annual Meeting, Cambridge, Massachusetts, June 2005.
- C-129 Rife, Jason H., Pullen, Samuel P., Walter, Todd, and Enge, Per K., "Vertical Protection Levels for a Local Airport Monitor for WAAS," in Proceedings of The Institute of Navigation's Annual Meeting, Cambridge, Massachusetts, June 2005.

- C-130 Datta-Barua, Seeany, Walter, Todd, Blanch, Juan A., and Enge, Per K., "Can WAAS Availability Be Inferred From Geomagnetic Data? An Analysis," in Proceedings of the Ionospheric Effects Symposium 2005, Alexandria, Virginia, May 3-5, 2005.
- C-131 Blanch, Juan A., Walter, Todd, and Enge, Per K., "Error Bound Optimization using Second Order Cone Programming," in Proceedings of The Institute of Navigation's National Technical Meeting, San Diego, California, January 2005.
- C-132 Rife, Jason H., Walter, Todd, and Blanch, Juan A., "Overbounding SBAS and GBAS Error Distributions with Excess-Mass Functions," in Proceedings of the International Symposium on GNSS/GPS in Sydney, Australia, December 2004.
- C-133 Walter, Todd, Blanch, Juan A., and Rife, Jason H., "Treatment of Biased Error Distributions in SBAS," in Proceedings of the International Symposium on GNSS/GPS in Sydney, Australia, December 2004.
- C-134 Walter, Todd, Rajagopal, Sriram, Datta-Barua, Seebany, and Blanch, Juan A., "Protecting Against Unsourced Ionospheric Threats," in Proceedings of the Beacon Satellite Symposium, Trieste, Italy, October 2004.
- C-135 Blanch, Juan A., Walter, Todd, and Enge, Per K., "Ionospheric Estimation using Extended Kriging for a low latitude SBAS," in Proceedings of The Institute of Navigation GNSS Conference, Long Beach, California, September 2004.
- C-136 Luo, Ming, Pullen, Samuel P., Ene, Alexander, Qiu, Diu, Walter, Todd, and Enge, Per K., "Ionosphere Threat to LAAS: Updated Model, User Impact, and Mitigations," in Proceedings of The Institute of Navigation GNSS Conference, Long Beach, California, September 2004.
- C-137 Walter, Todd, Enge, Per K., and Reddan, Pat, "Modernizing WAAS," in Proceedings of The Institute of Navigation's GNSS Meeting, Long Beach, California, September 2004.
- C-138 Blanch, Juan A., Walter, Todd, and Enge, Per., "A New Ionospheric Estimation Algorithm for SBAS Combining Kriging and Tomography," in Proceedings of The Institute of Navigation's National Technical Meeting, San Diego, California, January 2004.
- C-139 Luo, Ming, Pullen, Samuel P., Walter, Todd, and Enge, Per K., "Ionosphere Spatial Gradient Threat for LAAS: Mitigation and Tolerable Threat Space," in Proceedings of The Institute of Navigation's National Technical Meeting, San Diego, California, January 2004.
- C-140 Phelts, R. Eric, Walter, Todd, and Enge, Per K., "Range Biases on the WAAS Geostationary Satellites," in Proceedings of The Institute of Navigation's National Technical Meeting, San Diego, California, January 2004.
- C-141 Rajagopal, Sriram, Walter, Todd, Datta-Barua, Seebany, Blanch, Juan, and Sakai, Takeyasu, "Correlation Structure of the Equatorial Ionosphere," in Proceedings of The Institute of Navigation's National Technical Meeting, San Diego, California, January 2004.
- C-142 Walter, Todd, Datta-Barua, Seebany, Blanch, Juan A., and Enge, Per K., "The Effects of Large Ionospheric Gradients on Single Frequency Airborne Smoothing Filters for

- WAAS and LAAS,” in Proceedings of The Institute of Navigation's National Technical Meeting, San Diego, California, January 2004.
- C-143 Phelts, R. Eric, Walter, Todd, and Enge, Per K., “Toward Real-Time SQM for WAAS: Improved Detection Techniques,” in Proceedings of The Institute of Navigation's GPS/GNSS Meeting, Portland, Oregon, September 2003.
- C-144 Blanch, Juan A., Walter, Todd, and Enge, Per K., “Adapting Kriging to the WAAS MOPS Ionospheric Grid,” in Proceedings of The Institute of Navigation's National Technical Meeting, Anaheim, California, January 2003.
- C-145 Blanch, Juan A., Walter, Todd, and Enge, Per K., “Measurement Noise versus Process Noise in Ionosphere Estimation for WAAS,” in Proceedings of The Institute of Navigation's National Technical Meeting, Anaheim, California, January 2003.
- C-146 Jan, Shau-Shiun, Walter, Todd, and Enge, Per K., “Techniques for Graceful Reversion from Dual to Single Frequency WAAS,” in Proceedings of The Institute of Navigation's National Technical Meeting, Anaheim, California, January 2003.
- C-147 Walter, Todd, Enge, Per K., and DeCleene, Bruce, “Integrity Lessons from the WAAS Integrity Performance Panel (WIPP),” in Proceedings of The Institute of Navigation's National Technical Meeting, Anaheim, California, January 2003.
- C-148 Pullen, Samuel P., Walter, Todd, and Enge, Per K., “System Overview, Recent Developments, and Future Outlook for WAAS and LAAS,” in Proceedings of the Tokyo University of Mercantile Marine GPS Symposium, Tokyo, Japan, November 11-13, 2002.
- C-149 Schloss, Peter, Phelts, R. Eric, Walter, Todd, and Enge, Per K., “A Simple Method of Signal Quality Monitoring for WAAS LNAV/VNAV,” in Proceedings of The Institute of Navigation's GPS Meeting, Portland, Oregon, September 2002.
- C-150 Bauregger, Frank N., Walter, Todd, Akos, Dennis M., and Enge, Per K., “A Novel Dual-Patch Anti-Jam GPS Antenna,” in Proceedings of at The Institute of Navigation's Annual Meeting, Albuquerque, New Mexico, June 2002.
- C-151 Luo, Ming, Pullen, Samuel P., Akos, Dennis M., Xie, Gang, Datta-Barua, Seebany, Walter, Todd, and Enge, Per K., “Assessment of Ionospheric Impact on LAAS Using WAAS Supertruth Data,” in Proceedings of The Institute of Navigation's Annual Meeting, Albuquerque, New Mexico, June 2002.
- C-152 Peterson, Benjamin B., Enge, Per K., Walter, Todd, Lo, Sherman C., Boyce, C. O. Lee, Wenzel, Robert, and Narins, Mitchell J., “Hazardously Misleading Information Analysis for Loran LNAV,” in Proceedings of the 3rd International Symposium on Integration of LORAN-C/Eurofix and EGNOS/Galileo, Munich, Germany, June 2002.
- C-153 Blanch, Juan A., Walter, Todd, and Enge, Per K., “Application of Spatial Statistics to Ionosphere Estimation for WAAS,” in Proceedings of The Institute of Navigation's National Technical Meeting, San Diego, California, January 2002.
- C-154 Datta-Barua, Seebany, Walter, Todd, Pullen, Samuel P., Luo, Ming, Blanch, Juan, and Enge, Per K., “Using WAAS Ionospheric Data to Estimate LAAS Short Baseline

- Gradients,” in Proceedings of The Institute of Navigation's National Technical Meeting, San Diego, California, January 2002.
- C-155 Jan, Shau-Shiun, Gebre-Egziabher, Demoz, Walter, Todd, and Enge, Per K., “Worst-Case Analysis of a 3-Frequency Receiver to Land a General Aviation Airplane,” in Proceedings of The Institute of Navigation's National Technical Meeting, San Diego, California, January 2002.
- C-156 Jan, Shau-Shiun, Chan, Wyant, Walter, Todd, and Enge, Per K., “Matlab Simulation Toolset for SBAS Availability Analysis,” in Proceedings of The Institute of Navigation's GPS Conference, Salt Lake City, Utah, September 2001.
- C-157 Blanch, Juan A., Walter, Todd, and Enge, Per K., “Ionospheric Threat Model Methodology for WAAS,” in Proceedings of The Institute of Navigation's Annual Meeting, Albuquerque, New Mexico, June 2001.
- C-158 Bauregger, Frank N., Walter, Todd, and Enge, Per K., “The Dielectric Cavity Antenna - An Alternative to the Choke Ring Antenna,” in Proceedings of the ION National Technical Meeting, Long Beach, California, January 2001.
- C-159 Walter, Todd, Hansen, Andrew J., and Enge, Per K., “Message Type 28,” in Proceedings of the ION National Technical Meeting, Long Beach, California, January 2001.
- C-160 Fuller, Richard A., Walter, Todd, and Enge, Per K., “Burst Mode Message Loss Effects On WAAS Availability,” in Proceedings of The Institute of Navigation's GPS Conference, Salt Lake City, Utah, September 2000.
- C-161 Hansen, Andrew J., Blanch, Juan A., Walter, Todd, and Enge, Per K., “Ionospheric Correlation Analysis for WAAS: Quiet and Stormy,” in Proceedings of The Institute of Navigation's GPS Conference, Salt Lake City, Utah, September 2000.
- C-162 Walter, Todd, Hansen, Andrew J., Blanch, Juan A., and Enge, Per K., “Robust Detection of Ionospheric Irregularities,” in Proceedings of The Institute of Navigation's GPS Conference, Salt Lake City, Utah, September 2000.
- C-163 Hansen, Andrew J., Peterson, Eric, Walter, Todd, and Enge, Per K., Correlation Structure of Ionospheric Estimation and Correlation for WAAS,” in Proceedings of The Institute of Navigation's NTM, Anaheim, California, January 2000.
- C-164 Walter, Todd, Hansen, Andrew J., and Enge, Per K., “Validation of the WAAS MOPS Integrity Equation,” in Proceedings of the ION Annual Meeting, Cambridge, Massachusetts, June 1999.
- C-165 Fuller, Richard A., Walter, Todd, Houck, Sharon W., and Enge, Per K., “Flight Trials of a Geostationary Satellite Based Augmentation System at High Latitudes and for Dual Satellite Coverage,” in Proceedings of the ION National Technical Meeting, San Diego, California, January 1999.
- C-166 Walter, Todd, “WAAS MOPS: Practical Examples,” in Proceedings of the ION National Technical Meeting, San Diego, California, January 1999.

- C-167 Fuller, Richard A., Dai, Donghai, Walter, Todd, Comp, Christopher J., Enge, Per K., and Powell, J. David, "Interoperation and Integration of Satellite Based Augmentation Systems," in Proceedings of the ION GPS '98, Nashville, Tennessee, September 1998.
- C-168 Comp, Christopher, Gazit, Ran, Walter, Todd, Enge, Per, "Improving WAAS Integrity and Availability: UDRE and GIVE Time Updates," Proceedings of the 10th International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GPS 1997), Kansas City, MO, pp. 1315-1234, September 1997.
- C-169 Dai, Donghai, Walter, Todd, Comp, Christopher J., Tsai, Yeo-Jyh, Ko, Ping-Ya, Enge, Per K., and Powell, J. David, "High Integrity Multipath Mitigation Techniques for Ground Reference Stations," in Proceedings of the ION GPS Conference, Kansas City, Missouri, September 1997.
- C-170 Hansen, Andrew J., Walter, Todd, and Enge, Per K., "Ionospheric Correction Using Tomography," in Proceedings of the ION GPS Conference, Kansas City, Missouri, September 1997.
- C-171 Walter, Todd, Enge, Per K., and Hansen, Andrew J., "A Proposed Integrity Equation for WAAS MOPS," in Proceedings of the 10th International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GPS 1997), Kansas City, MO, pp. 475-484, September 1997.
- C-172 Walter, Todd, Enge, Per K. and Hansen, Andrew J., "An Integrity Equation for Use with Space Based Augmentation Systems," in Proceedings of the European Satellite Navigation Conference in Munich, Germany, April 1997.
- C-173 Hansen, Andrew J., Chao, Yi-Chung, Walter, Todd, and Enge, Per K., "Ionospheric Estimation and Integrity Threat Detection," in Proceedings of the ION NTM'97, Santa Monica, California, January 1997.
- C-174 Chao, Yi-Chung, Tsai, Yeo-Jyh, Walter, Todd, Kee, Changdon, Enge, Per K., and Parkinson, Bradford W., "An Algorithm for Inter-frequency Bias Calibration and Application to WAAS Ionosphere Modeling," in Proceedings of the ION GPS, Palm Springs, California, September 1995.
- C-175 Cobb, H. Stewart, Lawrence, David G., Jock, R. I. Christie, Walter, Todd, Chao, Yi-Chung, Powell, J. David, and Parkinson, Bradford W., "Observed GPS Signal Continuity Interruptions," in Proceedings of the ION GPS, Palm Springs, California, September 1995.
- C-176 Walter, Todd and Enge, Per K., "Weighted RAIM for Precision Approach," in Proceedings of the ION GPS-95, Palm Springs, California, September 1995.
- C-177 Walter, T., Enge, P. and Van Graas, F. "Integrity for the Wide Area Augmentation System," in Proceedings of the 1995 Differential Satellite Navigation Symposium, Bergen, Norway, April, 1995.
- C-178 Walter, T., Kee, C., Chao, Y. C., Tsai, Y. J., Peled, U., Ceva, J., Barrows, A. K., Abbot, E., Powell, D., Enge, P. and Parkinson, B., "Real-Time Flight Demonstration of Wide-Area Differential GPS (WADGPS)," in Proceedings of the International Symposium on Precision Approach, Braunschweig Germany, February 1995.

- C-179 Chao, Yi-Chung, Tsai, Yeo-Jyh, Walter, Todd, Kee, Changdon, Enge, Per K., Parkinson, Bradford W., “The Ionospheric Model Improvement for the Stanford WAAS Network,” in Proceedings of the National Technical Meeting of The Institute of Navigation, Anaheim, CA, January 1995.
- C-180 Tsai, Yeo-Jyh, Chao, Yi-Chung, Walter, Todd, Kee, Changdon, Powell, J. David, Enge, Per K., and Parkinson, Bradford W., “Evaluation of Orbit and Clock Models for Real Time WAAS,” in Proceedings of the National Technical Meeting of The Institute of Navigation, Anaheim, California, January 1995.
- C-181 Walter, Todd, Kee, Changdon, Chao, Yi-Chung, Tsai, Yeo-Jyh, Peled, Uri, Ceva, Juan G., Barrows, Andrew K., Abbott, Eric C., Powell, J. David, Enge, Per K., and Parkinson, Bradford W., “Flight Trials of the Wide-Area Augmentation System (WAAS),” in Proceedings of the ION GPS 1994, Salt Lake City, Utah, September 1994.
- C-182 Walter, Todd, Pervan, Boris S., Enge, Per K., Herendeen, John, and Levin, Peter L., “Autonomous Integrity Monitoring and Wide Area DGPS,” in Proceedings of ION National Technical Meeting, San Diego, California, January 1994.
- C-183 Walter, T., “A Multi-Variance Analysis in the Time Domain” in Proceedings of the 1992 PTTI Plannings and Applications Meeting, December 1992.
- C-184 Kasdin, N. J. and Walter T., “Discrete Simulation of Power Law Noise” in Proceedings of the 1992 Frequency Control Symposium, June 1992.
- C-185 Everitt, C. W. F., Keiser, G. M., Axelrad, P., Breakwell, J. V., Buchman, S., DeBra, D. B., Kasdin, N. J., Lipa, J. A., Lockhart, J. M., Muhlfelder, B., Parkinson, B. W., Turneure, J. P., Walter, T., Vassar, R., “The Merits of Space and Cryogenic Operation in the Gravity Probe B Relativity Gyroscope Mission” in Proceedings of the first William Fairbank Meeting, Rome, Italy, 1990.

### Magazine Articles

- M-1 Lawrence, David, Cobb, H. Stewart, Gutt, Greg, O’Connor, Michael, Reid, Tyler G.R., Walter, Todd, and Whelan, David, “Navigation from LEO, Current Capability and Future Promise,” *GPS World*, pp. 42-48, July 2017.
- M-2 Walter, Todd, Blanch, Juan, and Kropp, Victoria, “Satellite Selection for Aviation Users of Multi-Constellation SBAS,” *Inside GNSS*, November/December 2016.
- M-3 McMilin, Emily B., Chen, Yu-Hsuan, De Lorenzo, David S., Akos, Dennis M., Walter, Todd, Lee, Thomas H., and Enge, Per K., “Single Antenna, Dual Use: Theory and Field Trial Results for Aerial Applications of Anti-Jam and Spoof Detection,” *Inside GNSS*, pp. 40-53, September/October 2015.
- M-4 Walter, Todd, “GNSS Augmentations: When A Signal in Space Isn't Enough,” *Inside GNSS*, September/October 2012.
- M-5 Walter, et al., “Innovation: Ionospheric Scintillations,” *GPS World*, pp. 44-50, April 2012.
- M-6 Heng, Liang, Gao, Grace Xingxin, Walter, Todd, and Enge, Per K., “Digging into GPS Integrity: Charting the Evolution of Signal-in-Space Performance by Data Mining

- 400,000,000 Navigation Messages,” *GPS World*, Vol. 22, No. 11, pp. 44-49, November 2011.
- M-7 Gao, Grace Xingxin, Heng, Liang, Walter, Todd, and Enge, Per K., “Breaking the Ice: Navigation in the Arctic,” *Inside GNSS*, Vol. 6, No. 5, pp. 60-64, Sept/Oct 2011.
- M-8 Pullen, Samuel P., Walter, Todd, and Enge, Per K., “Integrity for Non-Aviation Users,” *GPS World*, July 2011.
- M-9 Phelts, R. Eric, Gao, Grace Xingxin, Wong, Gabriel H. W., Heng, Liang, Walter, Todd, Enge, Per K., Erker, Stafen, and Thoelet, Steffen, “Aviation Grade: Chips off the Block IIF (Evaluating the IIF-1 for Aviation Users),” *Inside GNSS*, July/August 2010.
- M-10 Thoelet, Steffen, Erker, Stafen, Heng, Liang, Phelts, R. Eric, Gao, Grace Xingxin, Wong, Gabriel H. W., Walter, Todd, and Enge, Per K., “On the Air: New Signals from the First GPS IIF Satellite,” *Inside GNSS*, July/August 2010.
- M-11 Walter, Todd, Enge, Per, and Blanch, Juan A., “Future Augmented,” *GPS World*, March 2010.
- M-12 Gao, Grace Xingxin, Heng, Liang, De Lorenzo, David S., Lo, Sherman C., Akos, Dennis M., Chen, Alan, Walter, Todd, Enge, Per K., and Parkinson, Bradford W., “Modernization Milestone: Observing the First GPS Satellite with an L5 Payload,” *Inside GNSS*, Vol. 3, No. 4, pp. 60-64, May/June 2009.
- M-13 Gao, Grace Xingxin, Akos, Dennis M., Walter, Todd, and Enge, Per K., “GIOVE-B on the Air: Understanding Galileo's New Signals,” *Inside GNSS*, May/June 2008.
- M-14 Walter, Todd, Blanch, Juan, Enge, Per, Pervan, Boris, and Gratton, Livio, “Shaping Aviation Integrity: Two RAIMs for Safety,” *GPS World*, Vol. 19, No. 4, April 2008.

### Recent Invited Talks

- IT-1 *Dual-Frequency Multi-Constellation GNSS for Civil Aviation* for the International Technical Symposium for Navigation and Timing in Toulouse, France, November 2018
- IT-2 *Cyber Security for Civil Navigation* for the University of Arizona, October 2018
- IT-3 *GNSS Effects in Civil Aviation* for the ESA/JRC International Summer school on GNSS Loipersdorf, Austria, July, 2018
- IT-4 *GNSS Augmentation Systems for Aviation* for the 9th Chinese Satellite Navigation Conference, Harbin, China, May 2018
- IT-5 *Integrity of Satellite Navigation in the Arctic* for the Workshop on Challenges in Arctic Navigation, Olos, Finland April 2018

### Professional and Academic Service

- Co-Chair of the FAA’s WAAS Integrity Performance Panel (WIPP) (2005-Present)
- Member of the FAA’s SBAS Interoperability Working Group (IWG) (1997-Present)
- Member of the EU-U.S. Bilateral Working Group on cooperative use of GNSS (2009-Present)
- Associate Editor *NAVIGATION: Journal of the Institute of Navigation* (2015 – Present)
- Session Chair for more than 20 Institute of Navigation conferences (2000 – Present)
- Member of the Council of the Institute of Navigation (2002 – Present)
- President of the Institute of Navigation (2011-2012)
- Member of the FAA’s GNSS Evolutionary Architecture Study (GEAS) (2007-2011)
- Executive Vice President of the Institute of Navigation (2009-2010)
- Western Regional President of the Institute of Navigation (2008)
- General Chair of the Institute of Navigation’s GNSS Conference (2007)

Program Chair of the Institute of Navigation's GNSS Conference (2006)

Member of the FAA's WAAS Integrity Performance Panel (WIPP) (2000-2004)

General Chair of the Institute of Navigation's National Technical Meeting (2004)

Program Chair of the Institute of Navigation's National Technical Meeting (2003)