Samuel Phillip Pullen ("Sam")

Office: Dept. of Aero/Astronautics
Stanford University
Stanford, CA 94305-4035 USA
+1 (650) 488 – 3816

Home: 3 Greenpark Way
S. San Francisco, CA 94080 USA
+1 (650) 871 – 4048
+1 (650) 208 – 0971 (mobile)

E-mail: spullen@stanford.edu

URL: http://www.stanford.edu/~spullen

EDUCATION

Stanford University; Stanford, California
Ph.D., Aeronautics and Astronautics
Graduation Date: June 1996 GPA: 3.9/4.0
Thesis title: *Probabilistic Engineering Design Optimization: Applications to Spacecraft and Navigation Systems*
M.S., Aeronautics and Astronautics (emphasis on guidance and control systems)
Graduation Date: June 1990 GPA: 3.8/4.0

Massachusetts Institute of Technology; Cambridge, Massachusetts
S.B., Aeronautics and Astronautics
S.B., History (emphasis on modern Europe, technology strategy and development)
Graduation Date: June 1989 GPA: 4.8/5.0

EXPERIENCE

Senior Research Engineer, May 1999 – present (part-time since August 2011)
(Research Associate from July 1996 – April 1999)
Hansen Laboratories; Stanford University; Stanford, California

- Head of the Ground Based Augmentation System (GBAS)/Local Area Augmentation System (LAAS) research project, overseeing 5 – 15 engineers and graduate students working on algorithm research, safety assurance, prototype development, and test and validation.
- Developed, installed, and validated the first LAAS ground system prototype (the "Integrity Monitor Testbed") that included all elements and algorithms needed to protect user safety.
- Supported the FAA in developing specifications, algorithms, and test procedures for vendor-developed systems that evolved into the SLS-4000 LAAS Ground Facility. Several key components were first developed and tested in Stanford's Integrity Monitor Testbed.
- Developed original methods for spacecraft reliability and risk assessment for the Gravity Probe-B Relativity Mission developed at Stanford under NASA/MSFC management. This approach provides more useful guidance for late-stage development and testing.
- Provided research support to other projects, including WAAS and JPALS. Developed the first comprehensive predictions of WAAS performance and availability and extended these tools to support WAAS architecture design optimization.
- Taught graduate-level course, "Space Mechanics," in 1999-2000. Guest lecturer for "Global Positioning Systems" and other courses in Aero/Astro department.

Consultant, January 1996 – present (self-employed and via NavAstro, Los Gatos, California)

- Technical support of integrity algorithm design, test, and validation for multiple companies developing GBAS ground and airborne equipment.

- Expert witness analysis, report generation, and testimony concerning GPS/WAAS navigation and receiver algorithms as part of litigation in Montréal, Québec Superior Court.
- Technical support of system architecture, algorithm design, and requirements assessment for the U.S. Navy Sea-Based JPALS Program.
- Technical support of the GPS III Modernization effort under contract to the DOD GPS Joint Program Office, including requirements definition, civil augmentation system modeling, and performance simulation.
- Design and development of onboard GPS satellite self-integrity monitoring based on the principles and algorithms developed for LAAS (patent issued – see below).
- Expert witness deposition and testimony concerning GPS navigation and receiver algorithms as part of litigation in San Diego County, California Superior Court.
- Technical support of the Johns Hopkins University Applied Physics Laboratory GPS Risk Assessment, including problem formulation, performance simulation, and risk analysis.
- Tutorial presentations on LAAS fundamentals, algorithms, and aviation applications.
- Space satellite and constellation reliability analysis, including pre-launch reliability estimates (using thesis research methodology) and revisions after observing initial behavior in orbit.

Researcher, *on-site*: June - December 1990; *consultant*: January 1991 – September 1997
The RAND Corporation; Santa Monica, California
Examined the current and proposed future basing structures of the U.S. Air Force in Europe. Developed a software tool to model and assess future aircraft basing options. The results of this study were validated by subsequent experience as aircraft were withdrawn from Europe.

ACADEMIC AND PROFESSIONAL SERVICES

- **Associate Editor for Navigation,** ***IEEE Transactions on Aerospace and Electronic Systems,*** October 2007 – present
- **Tutorial Instructor** on GNSS augmentations and integrity at ION GNSS 2011 and 2012
- **Reviewer** for IEEE, AIAA, ION, and other journals, 1998 – present
- **Institute of Navigation (ION) Council Member,** January 2003 – January 2005
- **Session Chair** at multiple ION, IEEE, and other conferences

AWARDS AND HONORS

- Institute of Navigation (ION) *Early Achievement Award* (1999)
- ION GPS/GNSS Conference "Best Paper" Awards (1999, 2000, 2001, 2009)
- National Science Foundation Graduate Fellowship (1989)
- Tau Beta Pi and Sigma Gamma Tau engineering honor societies at MIT (1987, 1988)

OTHER SKILLS

- Japanese language ability and extensive familiarity with Japanese business and personal culture, including NSF-supported and consulting engagements in Japan.
- Extensive knowledge of finance, investing, and economics through consulting and private study.
- Proficient in programming (C, C++, Fortran), engineering/statistics applications (Matlab, R), and spreadsheet (Excel) applications.

PATENTS

[P01] G. Green, **S. Pullen**, "Self-monitoring satellite system," U.S. Patent No. 6,667,713, Issued Dec. 23, 2003. http://www.google.com/patents/about?id=HoMOAAAAEBAJ&dq=6,667,713

BOOK CHAPTERS AND REPORTS

[B3] J. Rife, **S. Pullen**, "Aviation Applications," Ch. 10 in *GNSS Applications and Methods*. S. Gleason, D. Gebre-Egziabher, Eds., Norwood, MA: Artech House, 2009. http://www.artechhouse.com/Detail.aspx?strIsbn=978-1-59693-329-3

[B2] **S. Pullen**, J. Rife, "Differential GNSS: Accuracy and Integrity," Ch. 4 in *GNSS Applications and Methods*. S. Gleason, D. Gebre-Egziabher, Eds., Norwood, MA: Artech House, 2009. http://www.artechhouse.com/Detail.aspx?strIsbn=978-1-59693-329-3

[B1] T. Corrigan, J. Hartranft, L. Levy, K. Parker, J. Pritchett, A. Pue, **S. Pullen**, T. Thompson, *GPS Risk Assessment Study: Final Report*. Laurel, MD., The Johns Hopkins University Applied Physics Laboratory, VS-99-007. January 1999. http://www.rvs.uni-bielefeld.de/publications/Incidents/DOCS/Research/Other/Article/gps-risk-ass.pdf

JOURNAL PAPERS

[J23] **S. Pullen**, B. Pervan, P. Enge, "A Detailed Overview of the Design and Operation of Ground Based Augmentation Systems," *Navigation* (invited – in preparation).

[J22] **S. Pullen**, P. Enge, "Using Outage History to Exclude High-Risk Satellites from GBAS Corrections," *Navigation* (invited – submitted for review).

[J21] J. Seo, J. Lee, **S. Pullen**, P. Enge, S. Close, "Targeted Parameter Inflation within Ground-Based Augmentation Systems to Minimize Anomalous Ionospheric Impact," *AIAA J. Aircraft*, Vol. 49, No. 2, March-April 2012, pp. 587-599. http://preview.tinyurl.com/JA-N2-12

[J20] J. Lee, S, Datta-Barua, G. Zhang, **S. Pullen**, P. Enge, "Observations of Low-Elevation Ionospheric Anomalies for Ground-Based Augmentation of GNSS," *Radio Science*, Vol. 46, Nov. 22, 2011. http://www.agu.org/journals/rs/rs1106/2011RS004776/2011RS004776.pdf

[J19] J. Lee, J. Seo, Y.S. Park, **S. Pullen**, P. Enge, "Ionospheric Gradient Threat Mitigation by Geometry Screening in GNSS Ground Based Augmentation Systems," *AIAA J. Aircraft*, Vol. 48, No. 4, July-Aug, 2011, pp. 1422-1433. http://preview.tinyurl.com/JA-N4-11

[J18] S. Datta-Barua, J. Lee, **S. Pullen**, M. Luo, A. Ene, D. Qiu, G. Zhang, P. Enge, "Ionospheric Threat Parameterization for Local Area Global-Positioning-System-Based Aircraft Landing Systems," *AIAA J. Aircraft*, Vol. 47, No. 4, July-Aug. 2010, pp. 1141-1151. http://preview.tinyurl.com/JA-N4-10

[J17] J. Lee, **S. Pullen**, P. Enge, "Sigma Overbounding using a Position Domain Method for the Local Area Augmentation of GPS," *IEEE Trans. Aerospace and Electronic Systems*, Vol. 45, No. 4, Oct. 2009, pp. 1262-1274. http://preview.tinyurl.com/TAES-N4-09

[J16] **S. Pullen**, Y.S. Park, P. Enge, "Impact and Mitigation of Ionospheric Anomalies on Ground−Based Augmentation of GNSS," *Radio Science*, Vol. 44, Aug. 2009. http://www.agu.org/journals/rs/rs0904/2008RS004084/

[J15] J. Rife, S. Khanafseh, **S. Pullen**, D. De Lorenzo, U.S. Kim, M. Koenig, T.Y. Chiou, B. Kempny, B. Pervan, "Navigation, Interference Suppression, and Fault Monitoring in the Sea-Based Joint Precision Approach and Landing System," *Proc. IEEE*, Vol. 96, No. 12, Dec. 2008, pp. 1958-1975. http://preview.tinyurl.com/PrIE-N12-08

[J14] J. Lee, **S. Pullen**, S. Datta-Barua, P. Enge, "Assessment of Ionosphere Spatial Decorrelation for Global Positioning System-Based Aircraft Landing Systems," *AIAA J. Aircraft*, Vol. 44, No. 5, Sept.-Oct. 2007, pp. 1662-1669. http://preview.tinyurl.com/JA-N5-07

[J13] **S. Pullen**, P. Enge, "An Overview of GBAS Integrity Monitoring with a Focus on Ionospheric Spatial Anomalies," *Indian J. Radio & Space Physics*, Vol. 36, Aug. 2007, pp. 249-260. http://preview.tinyurl.com/IRSP-07

[J12] J. Rife, **S. Pullen**, P. Enge, B. Pervan. "Paired Overbounding for Nonideal LAAS and WAAS Error Distributions," *IEEE Trans. Aerospace and Electronic Systems*, Vol. 42, No. 4, Oct. 2006, pp. 1386-1395. http://preview.tinyurl.com/TAES-N4-06

[J11] J. Lee, **S. Pullen**, P. Enge, B. Pervan, L. Gratton, " Monitoring Global Positioning System Satellite Orbit Errors for Aircraft Landing Systems," *AIAA J. Aircraft*, Vol. 43, No. 3, May-June 2006, pp. 799-808. http://preview.tinyurl.com/JA-N3-06

[J10] J. Lee, **S. Pullen**, P. Enge, "Sigma-Mean Monitoring for the Local Area Augmentation of GPS," *IEEE Trans. Aerospace and Electronic Systems*, Vol. 42, No. 2, April 2006, pp. 625-635. http://preview.tinyurl.com/TAES-N2-06

[J09] J. Rife, **S. Pullen**, "The Impact of Measurement Biases on Availability for Category III LAAS," *Navigation*, Vol. 52, No. 4, Winter 2005-2006, pp. 215-228. http://www.ion.org/search/view_abstract.cfm?jp=j&idno=2408

[J08] D. Gebre-Egziabher, A. Razavi, P. Enge, J. Gautier, **S. Pullen**, B. Pervan, D. Akos, "Sensitivity and Performance Analysis of Doppler-Aided GPS Carrier-Tracking Loops," *Navigation*, Vol. 52, No. 2, Summer 2005, pp. 49-60. http://www.ion.org/search/view_abstract.cfm?jp=j&idno=2392

[J07] M.B. Heo, B. Pervan, **S. Pullen**, J. Gautier, P. Enge, D. Gebre-Egziabher, "Autonomous Fault Detection with Carrier-Phase DGPS for Shipboard Landing Navigation," *Navigation*, Vol. 51, No. 3, Fall 2004, pp. 185-198. http://www.ion.org/search/view_abstract.cfm?jp=j&idno=2376

[J06] B. Pervan, F.C. Chan, D. Gebre-Egziabher, **S. Pullen**, P. Enge, G. Colby, "Performance Analysis of Carrier-Phase DGPS Navigation for Shipboard Landing of Aircraft," *Navigation*, Vol. 50, No. 3, Fall 2003, pp. 181-192. http://www.ion.org/search/view_abstract.cfm?jp=j&idno=2354

[J05] T. Shimomura, **S. Pullen**, "Strictly Positive Real H_2 Controller Synthesis via Iterative Algorithms for Convex Optimization," *AIAA J. Guidance, Control, and Dynamics*, Vol. 25, No. 6, Nov.-Dec. 2002, pp. 1003-1011. http://preview.tinyurl.com/JGCD-N6-02

[J04] B. Pervan, **S. Pullen**, D. Lawrence, K. Gromov, J. Christie, G. Opshaug, V. Lu, P.Y. Ko, P. Enge, B. Parkinson, "Prototype LAAS Architecture Design Considerations," *GPS Solutions*, Vol. 2, No. 1, Summer 1998, pp. 49-61. http://www.springerlink.com/content/u2my9fak3urqp8h6/fulltext.pdf

[J03] B. Pervan, **S. Pullen**, J. Christie, "A Multiple Hypothesis Approach to Satellite Navigation Integrity," *Navigation*, Vol. 45, No. 1, Spring 1998, pp. 61-84. http://www.ion.org/search/view_abstract.cfm?jp=j&idno=6

[J02] B. Pervan, D. Lawrence, K. Gromov, G. Opshaug, J. Christie, P.Y. Ko, A. Mitelman, **S. Pullen**, P. Enge, B. Parkinson, "Flight Test Evaluation of an Alternative Local Area Augmentation System Architecture," *Navigation*, Vol. 45, No. 1, Spring 1998, pp. 31-38. http://www.ion.org/search/view_abstract.cfm?jp=j&idno=3

[J01] P. Enge, T. Walter, **S. Pullen**, C. Kee, Y.C. Chao, Y.J. Tsai, "Wide Area Augmentation of the Global Positioning System," *Proc. IEEE*, Vol. 14, No. 8, Aug. 1996, pp. 1063-1088. http://preview.tinyurl.com/PrIE-N8-96

MAGAZINE ARTICLES

[A06] **S. Pullen**, G. Gao "GNSS Jamming in the Name of Privacy: Potential Threat to GPS Aviation," *Inside GNSS*, Vol. 7, No. 2, March/April 2012, pp. 34-43. http://www.insidegnss.com/auto/marapr12-Pullen.pdf

[A05] **S. Pullen**, T. Walter, P. Enge, "Integrity for Non-Aviation Users," *GPS World*. Vol. 22, No. 7, July 2011. http://www.gpsworld.com/transportation/road/integrity-non-aviation-users-11847

[A04] **S. Pullen**, "Expert Advice: Integrity – Lessons from the 2008 Financial Collapse," *GPS World*. Vol. 21, No. 2, Feb. 2010. http://www.gpsworld.com/transportation/aviation/expert-advice-integrity-lessons-2008-financial-collapse-9426

[A03] M. Petovello, **S. Pullen**, J. Syrjärinne, L. Wirola, "Quantifying the performance of navigation systems and standards for assisted-GNSS," *Inside GNSS*, Vol. 3, No. 6, Sept./Oct. 2008. http://www.insidegnss.com/auto/sepoct08-gnsssolutions.pdf

[A02] T. Langenstein, **S. Pullen**, H. Jun, D. Yun, C. Kee, B. Parkinson, "Centimeter-Accuracy Indoor Navigation Using GPS-Like Pseudolites," *GPS World*. Vol. 12, No. 11, Nov. 2001. http://www.gpsworld.com/wireless/indoor-positioning/centimeter-accuracy-indoor-navigation-using-gps-like-pseudolites-716

[A01] D. Akos, M. Luo, **S. Pullen**, P. Enge, "Ultra-Wideband and GPS: Can They Co-Exist?" *GPS World*. Vol. 12, No. 9, Sept. 2001. http://www.gpsworld.com/gps/ultra-wideband-and-gps-can-they-co-exist-1483

INVITED TALKS (Since 2003)

[T22] "Unintentional RF Interference to GNSS: A Growing Problem," *18th Korean GNSS Workshop*, Jeju, Korea, Nov. 3, 2011.

[T21] "The Impact of Personal Privacy Devices on GBAS and Potential Mitigations," *3rd Asia-Oceania Regional Workshop on GNSS*, Jeju, Korea, Nov. 2, 2011.

[T20] "Improvements to GBAS Ionospheric Mitigation," *International GBAS Working Group (I-GWG) 11 Meeting*, Osaka, Japan, Feb. 23, 2011.

[T19] "GNSS Research at Stanford University: Recent Activities and Results," *Tokyo University of Mercantile Marine*, Etchujima, Tokyo, Japan, Nov. 15, 2010.

[T18] "Recent Progress on GNSS and Ground-Based Augmentation Systems (GBAS)," *JAXA Chofu Aerospace Center (CAC)*, Chofu, Tokyo, Japan, Nov. 9, 2010.

[T17] "Highlights of Recent Stanford Work on GBAS," *German Aerospace Center (DLR)*, Oberpfaffenhofen (Munich), Germany, Sept. 30, 2010.

[T16] "Ionospheric Anomaly Mitigation: Present and Future," *International GBAS Working Group (I-GWG) 10 Meeting*, Brussels, Belgium, June 3, 2010.

[T15] "Recent Stanford GBAS Research: CAT III and DCPS," *German Aerospace Center (DLR)*, Oberpfaffenhofen (Munich), Germany, March 3, 2010.

[T14] "An Overview of Ground-Based Augmentation of GNSS," *Technical University of Braunschweig*, Braunschweig, Germany, Feb. 24, 2010.

[T13] "Stanford GNSS Research: Recent Activities and Results," *German Aerospace Center (DLR)*, Oberpfaffenhofen (Munich), Germany, Feb. 22, 2010.

[T12] "Local Area Augmentation of the Global Positioning System: An Overview of the Technology and its Development," *Stanford University*, AA 297 Seminar, May 13, 2009.

[T11] "Completion of CAT I LAAS Integrity Analysis and Future Work," *German Aerospace Center (DLR)*, Oberpfaffenhofen (Munich), Germany, Oct. 1, 2008.

[T10] "Fundamentals of Ground Based Augmentation Systems (GBAS) and Key Drivers of GBAS User Performance," *Japan GPS/GNSS Symposium 2007*, Invited Tutorial, Tokyo, Japan, Nov. 20, 2007.

[T09] "LAAS Overview and Highlights of Stanford LAAS Research," *Peking University*, "Digital China" Symposium, Beijing, China, Nov. 16, 2007.

[T08] "LAAS Technical Overview and Key Details from Stanford Research," *Beihang University (BUAA)*, Beijing, China, Nov. 14, 2007.

[T07] "The Fundamentals of Satellite Navigation: Present and Future," *Beihang University (BUAA)*, Beijing, China, Nov. 13, 2007.

[T06] "An Update on LAAS Ionosphere Anomaly Mitigation Strategy for CONUS," *International GBAS Working Group (I-GWG) 6 Meeting*, Mukilteo (Seattle), Washington, July 18, 2007.

[T05] "Ionosphere Anomaly Mitigation for CAT I GBAS Users Outside CONUS," *International GBAS Working Group (I-GWG) 5 Meeting*, Toulouse, France, Nov. 29, 2006.

[T04] "Mitigation of Ionosphere Spatial Anomaly Threat to GBAS," *International GBAS Working Group (I-GWG) 4 Meeting*, Sydney, Australia, Feb. 8, 2006.

[T03] "Update on LAAS Ionosphere Spatial Anomaly Threat Studies," *RTCA Special Committee 159*, Washington, DC, March 8, 2005.

[T02] "Status of CAT I LAAS Ionosphere Anomaly Resolution," *RTCA Special Committee 159*, Washington, DC, Oct. 5, 2004.

[T01] "System Overview, Recent Developments, and Future Outlook for SBAS and GBAS," *Osaka Prefectural University*, Sakai, Osaka, Japan, Nov. 21, 2003.

CONFERENCE PAPERS (*Note*: within numbering, "[Mxy]" = "[C1xy]")

[M08] E. Bang, J. Lee, J. Seo, **S. Pullen**, S. Close, "Automated Ionospheric Front Velocity Estimation Algorithm for Ground-Based Augmentation Systems," *Proc. ION ITM 2012*, Newport Beach, CA, Jan. 30-Feb. 1, 2012, pp. 1570-1580. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=10035

[M07] J. Lee, S. Jung, M. Kim, J. Seo, **S. Pullen**, S. Close, "Results from Automated Ionospheric Data Analysis for Ground-Based Augmentation Systems (GBAS)," *Proc. ION ITM 2012*, Newport Beach, CA, Jan. 30-Feb. 1, 2012, pp. 1451-1461. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=10029

[M06] **S. Pullen**, G. Gao, C. Tedeschi, J. Warburton, "The Impact of Uninformed RF Interference on GBAS and Potential Mitigations," *Proc. ION ITM 2012*, Newport Beach, CA, Jan. 30-Feb. 1, 2012, pp. 780-789. http://waas.stanford.edu/~wwu/papers/gps/PDF/PPDInterference_Pullen_Gao_ITM2012.pdf

[M05] **S. Pullen**, P. Enge, "Satellite Selection and Integrity Optimization for Future Multi-Constellation GBAS," *Proc. ION GNSS 2011*, Portland, CA, Sept. 19-23, 2011. http://www.ion.org/meetings/abstract.cfm?meetingID=34&pid=478&t=C&s=5

[M04] J. Lee, E. Bang, S. Yung, **S. Pullen**, "Automated Front Speed Computation of Ionospheric Anomalies for Ground-Based Augmentation Systems," Poster Paper, *Proc. 13th Int'l. Ionospheric Effects Symp. (IES2011)*, Alexandria, VA, May 17-19, 2011. http://www.ies2011.com

[M03] J. Lee, S. Jung, **S. Pullen**, "Enhancements of Long Term Ionospheric Anomaly Monitoring for the Ground-Based Augmentation System," *Proc. ION ITM 2011*, San Diego, CA, Jan. 24-26, 2011, pp. 930-941. http://ion.org/search/view_abstract.cfm?jp=p&idno=9539

[M02] **S. Pullen**, T. Walter, P. Enge, "SBAS and GBAS Integrity for Non-Aviation Users: Moving Away from 'Specific Risk'," *Proc. ION ITM 2011*, San Diego, CA, Jan. 24-26, 2011, pp. 533-545. http://ion.org/search/view_abstract.cfm?jp=p&idno=9495

[M01] Y.S. Park, **S. Pullen**, P. Enge, "A Study of Severe Multipath Errors for the Proposed GBAS Airport Surface Movement Application," *Proc. ION GNSS 2010*, Portland, OR, Sept. 21-24, 2010, pp. 2661-2671. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=9373

[M00] J. Lee, S. Jung, E. Bang, **S. Pullen**, P. Enge, "Long Term Monitoring of Ionospheric Anomalies to Support the Local Area Augmentation System," *Proc. ION GNSS 2010*, Portland, OR, Sept. 21-24, 2010, pp. 2651-2660. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=9372

[C99] S. Khanafseh, F. Yang, B. Pervan, **S. Pullen**, J. Warburton, "Carrier Phase Ionospheric Gradient Ground Monitor for GBAS with Experimental Validation," *Proc. ION GNSS 2010*, Portland, OR, Sept. 21-24, 2010, pp. 2603-2610. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=9368

[C98] K. Suzuki, **S. Pullen**, P. Enge, T. Ono, "Evaluation of Dual-Frequency GBAS Performance using Data from Public Receiver Networks," *Proc. ION GNSS 2010*, Portland, OR, Sept. 21-24, 2010, pp. 2592-2602. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=9367

[C97] Y.S. Park, **S. Pullen**, P. Enge, "Enabling LAAS Airport Surface Movement: Mitigating the Anomalous Ionospheric Threat," *Proc. IEEE/ION PLANS 2010*, Indian Wells, CA, May 4-6, 2010, pp. 667-679. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=8989

[C96] H. Tang, **S. Pullen**, P. Enge, L. Gratton, B. Pervan, M. Brenner, J. Scheitlin, P. Kline, "Ephemeris Type A Fault Analysis and Mitigation for LAAS," *Proc. IEEE/ION PLANS 2010*, Indian Wells, CA, May 4-6, 2010, pp. 654-666. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=8988

[C95] T. Murphy, M. Harris, **S. Pullen**, Y.S. Park, "GBAS Differentially Corrected Positioning Service Ionospheric Anomaly Errors Evaluated in an Operational Context," *Proc. ION ITM 2010*, San Diego, CA, Jan. 25-27, 2010, pp. 394-410. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=8820

[C94] **S. Pullen**, "Providing Integrity for Satellite Navigation: Lessons Learned (Thus Far) from the Financial Collapse of 2008 – 2009," *Proc. ION GNSS 2009*, Savannah, GA, Sept. 22-25, 2009, pp. 1305-1316. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=8540

[C93] Y.S. Park, **S. Pullen**, P. Enge, "Enabling the LAAS Differentially Corrected Positioning Service (DCPS): Design and Requirements Alternatives," *Proc. ION GNSS 2009*, Savannah, GA, Sept. 22-25, 2009, pp. 1149-1158. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=8523

[C92] **S. Pullen**, "Satellite Navigation Integrity Assurance: Lessons Learned from Hurricane Katrina," *Proc. ION GNSS 2008*, Savannah, GA, Sept. 16-19, 2008 (presentation only). http://preview.tinyurl.com/GNSS08-pres

[C91] N. Kubo, **S. Pullen**, "Instantaneous RTK Positioning Based on User Velocity Measurements," *Proc. ION GNSS 2008*, Savannah, GA, Sept. 16-19, 2008, pp. 1406-1417. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=8053

[C90] **S. Pullen**, Y.S. Park, P. Enge, "The Impact and Mitigation of Ionosphere Anomalies on Ground-Based Augmentation of GNSS," *Proc. 12th Int'l. Ionospheric Effects Symp. (IES 2008)*, Alexandria, VA, May 13-15, 2008, pp. 263-270. http://waas.stanford.edu/~wwu/papers/gps/PDF/PullenIES08.pdf

[C89] Y.S. Park, **S. Pullen**, P. Enge, "Mitigation of Anomalous Ionosphere Threat to Enhance Utility of LAAS Differentially Corrected Positioning Service (DCPS)," *Proc. IEEE/ION PLANS 2008*, Monterey, CA, May 6-8, 2008, pp. 285-293. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=7821

[C88] S. Ramakrishnan, J. Lee, **S. Pullen**, P. Enge, "Targeted Ephemeris Decorrelation Parameter Inflation for Improved LAAS Availability during Severe Ionosphere Anomalies," *Proc. ION NTM 2008*, San Diego, CA, Jan. 28-30, 2008, pp. 354-366. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=7694

[C87] **S. Pullen**, "Worldwide Trends in GNSS Development and their Implications for Civil User Performance and Safety," *Proc. Japan GPS/GNSS Symposium 2007*, Tokyo, Japan, Nov. 20-22, 2007. http://waas.stanford.edu/~wwu/papers/gps/PDF/PullenJapanGNSS07.pdf

[C86] S. Datta-Barua, T. Walter, **S. Pullen**, Per Enge, "Modeling the 20 November 2003 Ionosphere Storm with GRACE," *Proc. ION GNSS 2007*, Fort Worth, TX, Sept. 25-28, 2007, pp. 2840-2848. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=7635

[C85] Y.S. Park, G. Zhang, **S. Pullen**, J. Lee, P. Enge, "Data-Replay Analysis of LAAS Safety During Ionosphere Storms," *Proc. ION GNSS 2007*, Fort Worth, TX, Sept. 25-28, 2007, pp. 404-414. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=7455

[C84] J. Rife, **S. Pullen**, P. Enge, "Evaluating Fault-Mode Protection Levels at the Aircraft in Category III LAAS," *Proc. ION 63rd Annual Meeting*, Cambridge, MA, April 23-25, 2007, pp. 356-371. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=7266

[C83] G. Zhang, J. Lee, S. Datta-Barua, **S. Pullen**, P. Enge, "Low-Elevation Ionosphere Spatial Anomalies Discovered from the 20 November 2003 Storm," *Proc. ION NTM 2007*, San Diego, CA, Jan. 22-24, 2007. http://waas.stanford.edu/~wwu/papers/gps/PDF/ZhangIONNTM07.pdf

[C82] H. Konno, **S. Pullen**, J. Rife, P. Enge, "Ionosphere Monitoring Methodology for Hybrid Dual-Frequency LAAS," *Proc. ION GNSS 2006*, Fort Worth, TX, Sept. 26-29, 2006, pp. 409-424. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=6882

[C81] J. Lee, M. Luo, **S. Pullen**, Y.S. Park, P. Enge, M. Brenner, "Position-Domain Geometry Screening to Maximize LAAS Availability in the Presence of Ionosphere Anomalies," *Proc. ION GNSS 2006*, Fort Worth, TX, Sept. 26-29, 2006, pp. 393-408. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=6900

[C80] **S. Pullen**, J. Rife, P. Enge, "Prior Probability Model Development to Support System Safety Verification in the Presence of Anomalies," *Proc. IEEE/ION PLANS 2006*, San Diego, CA, April 25-27, 2006, pp. 1127-1136. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=6759

[C79] J. Lee, **S. Pullen**, S. Datta-Barua, P. Enge, "Assessment of Nominal Ionosphere Spatial Decorrelation for LAAS," *Proc. IEEE/ION PLANS 2006*, San Diego, CA, April 25-27, 2006, pp. 506-514. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=6679

[C78] J. Rife, **S. Pullen**, T. Walter, E. Phelts, B. Pervan, P. Enge, "WAAS-Based Threat Monitoring for a Local Airport Monitor (LAM) that Supports Category I Precision Approaches," *Proc. IEEE/ION PLANS 2006*, San Diego, CA, April 25-27, 2006, pp. 468-482. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=6676

[C77] J. Seo, J. Rife, **S. Pullen**, T. Walter, P. Enge "Field Data Analysis for a Range-Based Local Airport Monitor for WAAS," *Proc. ION NTM 2006*, Monterey, CA, Jan. 18-20, 2006, pp. 748-758. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=6579

[C76] H. Konno, **S. Pullen**, J. Rife, P. Enge, "Evaluation of Two Types of Dual-Frequency Differential GPS Techniques under Anomalous Ionosphere Conditions," *Proc. ION NTM 2006*, Monterey,

CA, Jan. 18-20, 2006, pp. 735-747. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=6578

[C75] M. Luo, **S. Pullen**, S. Datta-Barua, G. Zhang, T. Walter, P. Enge, "LAAS Study of Slow-Moving Ionosphere Anomalies and Their Potential Impacts," *Proc. ION GNSS 2005*, Long Beach, CA, Sept. 13-16, 2005, pp. 2337-2349. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=6439

[C74] M. Koenig, J. Rife, **S. Pullen**, P. Enge, "Optimizing Channel Selection for the JPALS Land-based Integrity Monitor Dual Frequency Implementation," *Proc. ION GNSS 2005*, Long Beach, CA, Sept. 13-16, 2005, pp. 62-72. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=6195

[C73] B. Peterson, **S. Pullen**, B. Pervan, G. McGraw, T. Skidmore, S. Anderson, "Investigation of Common Architectures for Land and Sea-Based JPALS," *Proc. ION GNSS 2005*, Long Beach, CA, Sept. 13-16, 2005, pp. 26-37. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=6191

[C72] T. Walter, **S. Pullen**, J. Rife, J. Seo, P. Enge, "The Advantages of Local Monitoring and VHF Data Broadcast for SBAS," *Proc. ENC GNSS 2005*, Munich, Germany, July 19-22, 2005. http://waas.stanford.edu/~wwu/papers/gps/PDF/WalterENCGNSS05.pdf

[C71] Y. Yun, C. Kee, J. Rife, M. Luo, **S. Pullen**, P. Enge, "Detecting RFI Through Integrity Monitoring at a DGPS Reference Station," *Proc. ION 61st Annual Meeting*, Cambridge, MA, June 27-29, 2005, pp. 795-804. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=6141

[C70] J. Rife, **S. Pullen**, "The Impact of Measurement Biases on Availability for CAT III LAAS," *Proc. ION 61st Annual Meeting*, Cambridge, MA, June 27-29, 2005, pp. 759-773. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=6138

[C69] J. Rife, **S. Pullen**, T. Walter, P. Enge, "Vertical Protection Levels for Local Airport Monitor for WAAS," *Proc. ION 61st Annual Meeting*, Cambridge, MA, June 27-29, 2005, pp. 745-758. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=6137

[C68] H. Konno, **S. Pullen**, M. Luo, P. Enge, "Analysis of Ionosphere Gradient Using Japan GEONET Data," *Proc. ION NTM 2005*, San Diego, CA, Jan. 24-26, 2005, pp. 1118-1129. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=6079

[C67] M. Koenig, J. Rife, J. Gautier, **S. Pullen**, P. Enge "Development of the JPALS Land-based Integrity Monitor Test Platform," *Proc. ION NTM 2005*, San Diego, CA, Jan. 24-26, 2005, pp. 182-189. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=5981

[C66] A. Ene, D. Qiu, M. Luo, **S. Pullen**, P. Enge, "A Comprehensive Ionosphere Storm Data Analysis Method to Support LAAS Threat Model Development," *Proc. ION NTM 2005*, San Diego, CA, Jan. 24-26, 2005, pp. 110-130. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=5976

[C65] **S. Pullen**, P. Enge, "A Civil User Perspective on Near-Term and Long-Term GPS Modernization," *Proc. Japan GPS/GNSS Symposium 2004*, Tokyo, Japan, Nov. 17-19, 2004. http://waas.stanford.edu/~wwu/papers/gps/PDF/PullenJapanGNSS04.pdf

[C64] J. Rife, **S. Pullen**, B. Pervan, "Core Overbounding and its Implications for LAAS Integrity," *Proc. ION GNSS 2004*, Long Beach, CA, Sept. 21-24, 2004, pp. 2810-2821. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=5964

[C63] M. Luo, **S. Pullen**, A. Ene, D. Qiu, T. Walter, P. Enge, "Ionosphere Threat to LAAS: Updated Model, User Impact, and Mitigations," *Proc. ION GNSS 2004*, Long Beach, CA, Sept. 21-24, 2004, pp. 2771-2785. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=5961

[C62] L. Gratton, S. Khanafseh, B. Pervan, **S. Pullen**, J. Warburton, "Experimental Observations and Integrity Monitor Applications of LAAS IMLA Carrier Phase Measurements," *Proc. ION GNSS 2004*, Long Beach, CA, Sept. 21-24, 2004, pp. 2259-2270. http://www.ion.org/search/view_abstract.cfm? jp=p&idno=5910

[C61] D. Akos, J. Weiss, T. Murphy, **S. Pullen**, "Airborne Multipath Investigation via a GPS Software Receiver," *Proc. ION GNSS 2004*, Long Beach, CA, Sept. 21-24, 2004, pp. 1822-1831. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=5866

[C60] **S, Pullen**, P. Enge, "Satellite Integrity Monitoring Concepts for GPS/Galileo Augmentation Systems," *Proceedings of ION GNSS 2004*, Long Beach, CA., Sept. 21-24, 2004, pp. 1674-1682. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=5848

[C59] T.Y. Chiou, S. Alban, S. Atwater, J. Gautier, **S. Pullen**, P. Enge, D. Akos, D. Gebre-Egziabher, B. Pervan, "Performance Analysis and Experimental Validation of a Doppler-Aided GPS/INS Receiver for JPALS Applications," *Proc. ION GNSS 2004*, Long Beach, CA, Sept. 21-24, 2004, pp. 1609-1618. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=5841

[C58] J. Rife, **S. Pullen**, B. Pervan, P. Enge, "Paired Overbounding and Application to GPS Augmentation," *Proc. IEEE PLANS 2004*, Monterey, CA, April 26-29, 2004, pp. 439-446. http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=1309027

[C57] L. Gratton, B, Pervan, **S. Pullen**, "Orbit Ephemeris Monitors for Category I LAAS," *Proc. IEEE PLANS 2004*, Monterey, CA, April 26-29, 2004, pp. 429-438. http://ieeexplore.ieee.org/xpls/abs_all.jsp? arnumber=1309026

[C56] M.B. Heo, B. Pervan, J. Gautier, **S. Pullen**, P. Enge, D. Gebre-Egziabher, "Robust Airborne Navigation Algorithms for SRGPS," *Proc. IEEE PLANS 2004*, Monterey, CA, April 26-29, 2004, pp. 175-183. http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=1308991

[C55] A. Mitelman, R.E. Phelts, D. Akos, **S. Pullen**, P. Enge, "Signal Deformations on Nominally Healthy GPS Satellites," *Proc. ION NTM 2004*, San Diego, CA, Jan. 26-28, 2004. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=5593

[C54] M. Luo, **S. Pullen**, T. Walter, P. Enge, "Ionosphere Spatial Gradient Threat for LAAS: Mitigation and Tolerable Threat Space," *Proc. ION NTM 2004*, San Diego, CA, Jan. 26-28, 2004, pp. 490-501. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=5526

[C53] C. Kee, H. So, J. Kim, H. Jun, P. Enge, **S. Pullen**, "Effect of the Error in the Line-of-Sight Unit Vector on Pseudolite-Based Positioning Systems," *Proc. ION NTM 2004*, San Diego, CA, Jan. 26-28, 2004, pp. 181-189. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=5494

[C52] D. Gebre-Egziabher, A. Razavi, P. Enge, J. Gautier, D. Akos, **S. Pullen**, B. Pervan, "Doppler Aided Tracking Loops for SRGPS Integrity Monitoring," *Proc. ION GPS/GNSS 2003*, Portland, OR, Sept. 9-12, 2003, pp. 2562-2571. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=5442

[C51] **S. Pullen**, J. Lee, G. Xie, P. Enge, "CUSUM-Based Real-Time Risk Metrics for Augmented GPS and GNSS," *Proc. ION GPS/GNSS 2003*, Portland, OR, Sept. 9-12, 2003, pp, 2275-2287. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=5412

[C50] M. Luo, **S. Pullen**, J. Dennis, H. Konno, G. Xie, T. Walter, P. Enge, S. Datta-Barua, T. Dehel, "LAAS Ionosphere Spatial Gradient Threat Model and Impact of LGF and Airborne Monitoring," *Proc. ION GPS/GNSS 2003*, Portland, OR, Sept. 9-12, 2003, Portland, OR., Sept. 9-12, 2003, pp. 2255-2274. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=5411

[C49] A.J. Van Dierendonck, C. Hegarty, **S. Pullen**, "A More Complete and Updated Methodology for Assessing Intrasystem and Intersystem Interference for GPS and Galileo," *Proc. ION GPS/GNSS 2003*, Portland, OR, Sept. 9-12, 2003, pp. 1484-1493. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=5331

[C48] J. Lee, **S. Pullen**, G. Xie, P. Enge, "LAAS Position-Domain Monitor Analysis and Failure-Test Verification," *Proc. 21st Int'l. Comm. Sat. Sys. Conf.*, Yokohama, Japan, AIAA 2003-2418, April 15-19, 2003. http://preview.tinyurl.com/AIAA03-2

[C47] G. Xie, **S. Pullen**, M. Luo, P. Enge, "Detecting Ionospheric Gradients with the Cumulative Sum (CUSUM) Method," *Proc. 21st Int'l. Comm. Sat. Sys. Conf.*, Yokohama, Japan, AIAA 2003-2415, April 15-19, 2003. http://preview.tinyurl.com/AIAA03-1

[C46] M. Luo, G. Xie, D. Akos, **S. Pullen**, P. Enge, "Radio Frequency Interference Validation Testing for LAAS Using the Stanford Integrity Monitor Testbed," *Proc. ION NTM 2003*, Anaheim, CA, Jan. 22-24, 2003, pp. 233-242. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=3767

[C45] **S. Pullen**, T. Walter, P. Enge, "System Overview, Recent Developments, and Future Outlook for WAAS and LAAS," *Proc. Japan GPS Symposium 2002*, Tokyo, Japan, Nov. 11-13, 2002, pp. 45-56. http://waas.stanford.edu/~wwu/papers/gps/PDF/PullenTokyo02.pdf

[C44] P.L. Normark, D. Akos, G. Xie, **S. Pullen**, M. Luo, P. Enge "The Integrity Monitor Testbed and Multipath Limiting Antenna Test Results," *Proc. ION GPS 2002*, Portland, OR, Sept. 24-27, 2002, pp. 2596-2601. http://ion.org/search/view_abstract.cfm?jp=p&idno=2284

[C43] **S. Pullen**, M. Luo, G. Xie, J. Lee, R.E. Phelts, D. Akos, P. Enge, "LAAS Ground Facility Design Improvements to Meet Proposed Requirements for Category II/III Operations," *Proc. ION GPS 2002*, Portland, OR, Sept. 24-27, 2002, pp. 1934-1947. http://ion.org/search/view_abstract.cfm?jp=p&idno=2212

[C42] M. Koenig, D. Gebre-Egziabher, **S. Pullen**, U.S. Kim, P. Enge, B. Pervan, F.C. Chan, G. Colby, "Sensitivity Analysis of the JPALS Shipboard Relative GPS Measurement Quality Monitor," *Proc. ION GPS 2002*, Portland, OR, Sept. 24-27, 2002, pp. 1900-1916. http://ion.org/search/view_abstract.cfm?jp=p&idno=2209

[C41] A. Mitelman, D. Akos, **S. Pullen**, P. Enge, "Estimation of ICAO Threat Model Parameters for Operational GPS Satellites," *Proc. ION GPS 2002*, Portland, OR, Sept. 24-27, 2002, pp. 12-19. http://ion.org/search/view_abstract.cfm?jp=p&idno=1998

[C40] M. Luo, **S. Pullen**, D. Akos, G. Xie, S. Datta-Barua, T. Walter, P. Enge "Assessment of Ionospheric Impact on LAAS Using WAAS Supertruth Data," *Proc. ION 58th Annual Meeting/CIGTF 21st Guidance Test Symp.*, Albuquerque, NM, June 24-26, 2002, pp. 175-186. http://ion.org/search/view_abstract.cfm?jp=p&idno=950

[C39] S. Datta-Barua, T. Walter, **S. Pullen**, M. Luo, J. Blanch, P. Enge "Using WAAS Ionospheric Data to Estimate LAAS Short Baseline Gradients," *Proc. ION NTM 2002*, San Diego, CA, Jan. 28-30, 2002, pp. 523-530. http://ion.org/search/view_abstract.cfm?jp=p&idno=246

[C38] M. Koenig, D. Gebre-Egziabher, **S. Pullen**, U.S. Kim, P. Enge, B. Pervan, F.C. Chan, G. Colby, "Analysis of Reference Antenna Motion on the JPALS Shipboard Integrity Monitor," *Proc. ION NTM 2002*, San Diego, CA, Jan. 28-30, 2002, pp. 382-389. http://ion.org/search/view_abstract.cfm?jp=p&idno=231

[C37] **S. Pullen**, G. Xie, P. Enge, "Soft Failure Diagnosis and Exclusion for GBAS Ground Facilities," *Proc. Royal Inst. Nav. (RIN) NAV 01*, London, UK, Nov. 6-8, 2001. http://www-leland.stanford.edu/~spullen/RIN-NAV-01.pdf

[C36] **S. Pullen**, J. Lee, M. Luo, B. Pervan, F.C. Chan, L. Gratton, "Ephemeris Protection Level Equations and Monitor Algorithms for GBAS," *Proc. ION GPS 2001*, Salt Lake City, UT, Sept. 11-14, 2001, pp. 1738-1749. http://ion.org/search/view_abstract.cfm?jp=p&idno=1852

[C35] R.E. Phelts, A. Mitelman, **S. Pullen**, D. Akos, P. Enge, "Transient Performance Analysis of a Multicorrelator Signal Quality Monitor," *Proc. ION GPS 2001*, Salt Lake City, UT, Sept. 11-14, 2001, pp. 1700-1710. http://ion.org/search/view_abstract.cfm?jp=p&idno=1850

[C34] P.L. Normark, G. Xie, D. Akos, **S. Pullen**, M. Luo, J. Lee, P. Enge, B. Pervan "The Next Generation Integrity Monitor Testbed for Ground System Development and Validation Testing," *Proc. ION GPS 2001*, Salt Lake City, UT, Sept. 11-14, 2001, pp. 1200-1208. http://ion.org/search/view_abstract.cfm?jp=p&idno=1798

[C33] L. Vidarsson, **S. Pullen**, G. Green, "Satellite Autonomous Integrity Monitoring and its Role in Enhancing GPS User Performance," *Proc. ION GPS 2001*, Salt Lake City, UT, Sept. 11-14, 2001, pp. 690-702. http://ion.org/search/view_abstract.cfm?jp=p&idno=1751

[C32] M. Luo, D. Akos, M. Koenig, G. Opshaug, **S. Pullen**, P. Enge, B. Erlandson, S. Frodge, "Testing and Research on Interference to GPS from UWB Transmitters," *Proc. ION GPS 2001*, Salt Lake City, UT, Sept. 11-14, 2001, pp. 1-13. http://ion.org/search/view_abstract.cfm?jp=p&idno=1697

[C31] J. Lee, **S. Pullen**, G. Xie, P. Enge, "LAAS Sigma-Mean Monitor Analysis and Failure-Test Verification," *Proc. ION 57th Annual Meeting/CIGTF 20th Guidance Test Symp.*, Albuquerque, NM, June 11-13, 2001, pp. 694-704. http://ion.org/search/view_abstract.cfm?jp=p&idno=909

[C30] G. Xie, **S. Pullen**, M. Luo, P.L. Normark, D. Akos, J. Lee, P. Enge, B. Pervan "Integrity Design and Updated Test Results for the Stanford LAAS Integrity Monitor Testbed," *Proc. ION 57th Annual Meeting/CIGTF 20th Guidance Test Symp.*, Albuquerque, NM, June 11-13, 2001, pp. 681-693. http://ion.org/search/view_abstract.cfm?jp=p&idno=908

[C29] B. Pervan, **S. Pullen**, I. Sayim, "Sigma Estimation, Inflation, and Monitoring in the LAAS Ground System," *Proc. ION GPS 2000*, Salt Lake City, UT, Sept. 19-22, 2000, pp. 1234-1244. http://ion.org/search/view_abstract.cfm?jp=p&idno=1525

[C28] G. McGraw, T. Murphy, M. Brenner, **S. Pullen**, A.J. Van Dierendonck, "Development of the LAAS Accuracy Models," *Proc. ION GPS 2000*, Salt Lake City, UT, Sept. 19-22, 2000, pp. 1212-1223. http://ion.org/search/view_abstract.cfm?jp=p&idno=1523

[C27] **S. Pullen**, M. Luo, S. Gleason, G. Xie, J. Lee, D. Akos, P. Enge, B. Pervan, "GBAS Validation Methodology and Test Results from the Stanford LAAS Integrity Monitor Testbed," *Proc. ION GPS 2000*, Salt Lake City, UT, Sept. 19-22, 2000, pp. 1191-1201. http://ion.org/search/view_abstract.cfm?jp=p&idno=1521

[C26] C. Kee, H. Jun, D. Yun, B. Kim, Y. Kim, B. Parkinson, T. Langenstein, **S. Pullen**, J.T. Lee, "Development of Indoor Navigation System Using Pseudolites," *Proc. ION GPS 2000*, Salt Lake City, UT, Sept. 19-22, 2000, pp. 1038-1045. http://ion.org/search/view_abstract.cfm?jp=p&idno=1504

[C25] M. Luo, D. Akos, **S. Pullen**, P. Enge, B. Erlandson, S. Frodge, "Interference to GPS from UWB Transmitters," *Proc. ION GPS 2000*, Salt Lake City, UT, Sept. 19-22, 2000, p. 981-992. http://ion.org/search/view_abstract.cfm?jp=p&idno=1497

[C24] A. Mitelman, R.E. Phelts, D. Akos, **S. Pullen**, P. Enge, "A Real Time Signal Quality Monitor for GPS Augmentation Systems," *Proc. ION GPS 2000*, Salt Lake City, UT, Sept. 19-22, 2000, pp. 862-871. http://ion.org/search/view_abstract.cfm?jp=p&idno=1483

[C23] B. Pervan, **S. Pullen**, J. Andreacchi, P. Enge, "Characterizing the Effect of Ionospheric Divergence and Decorrelation on LAAS," *Proc. ION GPS 2000*, Salt Lake City, UT, Sept. 19-22, 2000, pp. 653-661. http://ion.org/search/view_abstract.cfm?jp=p&idno=1460

[C22] K. Gromov, D. Akos, **S. Pullen**, P. Enge, B. Parkinson, "GIDL: Generalized Interference Detection and Localization System," *Proc. ION GPS 2000*, Salt Lake City, UT, Sept. 19-22, 2000, pp. 447-457. http://ion.org/search/view_abstract.cfm?jp=p&idno=1437

[C21] A.J. Van Dierendonck, D. Akos, **S. Pullen**, R.E. Phelts, P. Enge "Practical Implementation Considerations in the Detection of GPS Satellite Signal Failures," *Proc. IAIN World Congress/ION 56th Annual Meeting*, San Diego, CA, June 26-28, 2000, pp. 250-259. http://ion.org/search/view_abstract.cfm?jp=p&idno=773

[C20] D. Akos, E. Phelts, A. Mitelman, **S. Pullen**, P. Enge "GPS–SPS Signal Quality Monitor," *Proc. IEEE PLANS 2000*, San Diego, CA, March 13-16, 2000. http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=00838274

[C19] D. Akos, R.E. Phelts, **S. Pullen**, P. Enge, "Signal Quality Monitoring: Test Results," *Proc. ION NTM 2000*, Anaheim, CA, Jan. 26-28, 2000, pp. 536-541. http://ion.org/search/view_abstract.cfm?jp=p&idno=65

[C18] M. Luo, **S. Pullen**, J. Zhang, S. Gleason, G. Xie, J. Yang, D. Akos, P. Enge, "Development and Testing of the Stanford LAAS Ground Facility Prototype," *Proc. ION NTM 2000*, Anaheim, CA, Jan. 26-28, 2000, pp. 210-219. http://ion.org/search/view_abstract.cfm?jp=p&idno=25

[C17] L. Levy, A. Pue, T. Thompson, **S. Pullen**, "GPS Risk Assessment for Civil Aviation," *Proc. ION GPS 1999*, Nashville, TN, Sept. 14-17, 1999, pp. 2121-2130. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=3371

[C16] C. Kee, D. Yun, H. Jun, B. Parkinson, T. Langenstein, **S. Pullen**, "Precise Calibration of Pseudolite Positions in Indoor Navigation System," *Proc. ION GPS 1999*, Nashville, TN, Sept. 14-17, 1999, pp. 1499-1508. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=3306

[C15] S. Matsumoto, **S. Pullen**, M. Rotkowitz, B. Pervan, "GPS Ephemeris Verification for Local Area Augmentation System (LAAS) Ground Stations," *Proc. ION GPS 1999*, Nashville, TN, Sept. 14-17, 1999, pp. 691-704. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=3216

[C14] K. Gromov, D. Akos, **S. Pullen**, P. Enge, B. Parkinson "Interference Direction Finding for Aviation Applications of GPS," *Proc. ION GPS 1999*, Nashville, TN, Sept. 14-17, 1999, pp. 115-124. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=3159

[C13] J. Christie, P.Y. Ko, A. Hansen, D. Dai, **S. Pullen**, B. Pervan, B. Parkinson "The Effects of Local Ionospheric Decorrelation on LAAS: Theory and Experimental Results," *Proc. ION NTM 1999*, San Diego, CA, Jan. 25-27, 1999, pp. 769-777. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=730

[C12] **S. Pullen**, G. Opshaug, A. Hansen, T. Walter, P. Enge, B. Parkinson "A Preliminary Study of the Effect of Ionospheric Scintillation on WAAS User Availability in Equatorial Regions," *Proc. ION GPS 1998*, Nashville, TN, Sept. 15-18, 1998, pp. 687-699. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=3000

[C11] **S. Pullen**, B. Parkinson, "Optimal Augmentation of GPS using Inexpensive Geosynchronous Navigation Satellites", *Proc. ION GPS 1997*, Kansas City, MO, Sept. 16-19, 1997, pp. 1271-1281. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=2874

[C10] B. Pervan, **S. Pullen**, D. Lawrence, K. Gromov, J. Christie, G. Opshaug, V. Lu, P.Y. Ko, P. Enge, B. Parkinson, "Development, Implementation, and Testing of a Prototype LAAS Architecture," *Proc. GNSS 97*, Munich, Germany, April 21-25, 1997. http://waas.stanford.edu/~wwu/papers/gps/PDF/prototype_laas_bsp97.pdf

[C09] **S. Pullen**, P. Enge, B. Parkinson, "Control System Optimization with Unbounded Uncertainty: Application to Aircraft Precision Approach Using GPS," *Proc. IEEE CDC '96*, Kobe, Japan, Dec. 11-13, 1996, Vol. 2, pp. 1339-1340. http://ieeexplore.ieee.org/search/srchabstract.jsp?tp=&arnumber=572689

[C08] **S. Pullen**, B. Pervan, P. Enge, B. Parkinson, "A Comprehensive Integrity Verification Architecture for On-Airport LAAS Category III Precision Landing," *Proc. ION GPS 1996*, Kansas City, MO, Sept. 17-20, 1996, pp. 1623-1634. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=2699

[C07] Y.C. Chao, **S. Pullen**, P. Enge, B. Parkinson "Study of WAAS Ionospheric Integrity," *Proc. ION GPS 1996*, Kansas City, MO, Sept. 17-20, 1996, pp. 781-788. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=2610

[C06] **S. Pullen**, Y.C. Chao, P. Enge, B. Parkinson, "Effects of Local Ionospheric Anomalies on Navigation Performance and Integrity Using WAAS," *Proc. IEEE PLANS '96*, Atlanta, GA, April 22-26, 1996, pp. 574-581. http://ieeexplore.ieee.org/search/srchabstract.jsp?tp=&arnumber=509130

[C05] **S. Pullen**, P. Enge, B. Parkinson, "Global Optimization of GPS Augmentation Architectures using Genetic Algorithms," *Proc. ION GPS 1995*, Palm Springs, CA, Sept. 12-15, 1995, pp. 1403-1415. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=2502

[C04] **S. Pullen**, P. Enge, B. Parkinson, "A New Method for WAAS Coverage Prediction," *Proc. ION Annual Meeting 1995*, Colorado Springs, CO, June 5-7, 1995, pp. 501-513. http://www.ion.org/ search/view_abstract.cfm?jp=p&idno=1036

[C03] **S. Pullen**, B. Parkinson, "System Design under Uncertainty: Evolutionary Optimization of the Gravity Probe-B Spacecraft," *Proc. Parallel Problem Solving from Nature – PPSN III*, Jerusalem, Israel, Oct. 9-14, 1994, pp. 598-607. http://www.springerlink.com/content/ y0348016p2275385/

[C02] **S. Pullen**, P. Enge, B. Parkinson, "Simulation-Based Evaluation of WAAS Performance: Risk and Integrity Factors," *Proc. ION GPS 1994*, Salt Lake City, UT, Sept. 20-23, 1994, pp. 975-983. http://www.ion.org/search/view_abstract.cfm?jp=p&idno=3914

[C01] **S. Pullen**, B. Pervan, B. Parkinson, "A New Approach to GPS Integrity Monitoring using Prior Probability Models and Optimal Threshold Search," *Proc. IEEE PLANS '94*, Las Vegas, NV, April 12-15, 1994, pp. 739-746. http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=303384&tag=1