

AUTHOR INDEX

<i>Aarsaether, K. G., and Moan, T.</i> Adding the Human Element to Ship Manoeuvring Simulations	695
<i>Alnaqbi, A.</i> Precise GPS Positioning with Low-Cost Single-Frequency System in Multipath Environment	301
<i>Baniela, S. I.</i> Piracy at Sea: Somalia an Area of Great Concern	191
<i>Baniela, S.I., and Rios, Capt J. V.</i> The Risk Homeostasis Theory	607
<i>Banks, A., and Vincent, J.</i> Nature Inspired Target Reacquisition Strategies for Autonomous Vehicles in a Search Role	233
<i>Bijlsma, S. J.</i> Optimal Ship Routing with Ocean Current Included	565
<i>Borenstein, J., and Ojeda, L.</i> Heuristic Drift Elimination for Personnel Tracking Systems	591
<i>Broughton, D.</i> Michael Richey MBE Hon FRIN 1917–2009	187
<i>Carter, W. E., and Carter, M. S.</i> The Age of Sail: A Time when the Fortunes of Nations and Lives of Seamen Literally Turned with the Winds Their Ships Encountered at Sea	717
<i>Cooper, R. W., Lt Cdr.</i> Heaving The Lead	183
<i>Custers, B., and Kuiper, A.</i> Data on the Move – Privacy of Road Pricing	51
<i>Debnath, A. K., and Chin, H. C.</i> Navigational Traffic Conflict Technique: A Proactive Approach to Quantitative Measurement of Collision Risks in Port Waters	137
<i>DiLellio, J.</i> A Hybrid GNSS Integrity Design Leveraging a Priori Signal Noise Characteristics	513
<i>El-Diasty, M., and Pagiatakis S.</i> A Frequency-Domain INS/GPS Dynamic Response Method for Bridging GPS Outages	627
<i>Fernández Soto, J. L., Garay Seijo, R., Fragueta Formoso, J. A., Gregorio Iglesias, G. and Carral Couce, L.</i> Alternative Sources of Energy in Shipping	435
<i>Gade, K.</i> A Non-singular Horizontal Position Representation	395
<i>Gratton, L., Joerger, M., and Pervan, B.</i> Carrier Phase Relative RAIM Algorithms and Protection Level Derivation	215
<i>Groves, P. D., and Mather, C. J.</i> Receiver Interface Requirements for Deep INS/GNSS Integration and Vector Tracking	471
<i>Han, S., and Wang, J.</i> Land Vehicle Navigation with the Integration of GPS and Reduced INS: Performance Improvement with Velocity Aiding	153
<i>Han, S., and Wang, J.</i> A Novel Initial Alignment Scheme for Low-Cost INS Aided by GPS for Land Vehicle Applications	663
<i>Hilgerloh, G., Caprano, T., and Griebeler, E. M.</i> Calibrating the Operational Beam Width and Maximum Range of a Ship Radar Used for Bird Observations	363
<i>Huxtable, G., and Jackson, I.</i> Journey to Work: James Cook’s Transatlantic Voyages in the Grenville 1764–1767	207
<i>Ji, S., Chen, W., Ding, X., Chen, Y., Zhao, C., and Hu, C.</i> Potential Benefits of GPS/GLONASS/GALILEO Integration in an Urban Canyon – Hong Kong	681
<i>Kemp, J.</i> Experiences with Compasses in the Mid-20th Century	545
<i>Khan, K. A., Rizos, C., and Dempster, A. G.</i> Locata Performance Evaluation in the Presence of Wide- and Narrow-Band Interference	527
<i>Lee, J. K., and Jekeli, C.</i> Neural Network Aided Adaptive Filtering and Smoothing for an Integrated INS/GPS Unexploded Ordnance Geolocation System	251
<i>Lee, W-C., Ma, M-C., and Cheng, B-W.</i> Field Comparison of Driving Performance Using a Portable Navigation System	39
<i>Liu, W., Du, G., Zhan, X., and Zhai, C.</i> Assessment of Radio Frequency Compatibility Relevant to the Galileo E1/E6 and Compass B1/B3 Bands	419
<i>Lo, S. C., Peterson, B. B., Hardy, T., and Enge, P. K.</i> Improving Loran Coverage with Low Power Transmitters	23
<i>MacGougan, G., O’Keef, K., and Klukas, R.</i> Tightly-coupled GPS/UWB Integration	1
<i>Nastro, V., and Tancredi, U.</i> Great Circle Navigation with Vectorial Methods	557
<i>Nik, S. A., and Petovello, M. G.</i> Implementation of a Dual-Frequency GLONASS and GPS L1 C/A Software Receiver	269

<i>Park, B., and Kee, C.</i> The Compact Network RTK Method: An Effective Solution to Reduce GNSS Temporal and Spatial Decorrelation Error	343
<i>Piergentili, F., and Cordelli, E.</i> A New Method For DGPS Ambiguity Resolution	645
<i>Porretta, M., Schuster, W., Majumdar, A., and Ochieng, W.</i> Strategic Conflict Detection and Resolution Using Aircraft Intent Information	61
<i>Radišić, T., Novak, Doris, and Bucak, T.</i> The Effect of Terrain Mask on RAIM Availability	105
<i>Robertson, D.</i> Simplified Dead Reckoning on a Tortuous Path	379
<i>Sarma, A. D., Sultana, Q., and Srinivas, V. S.</i> Augmentation of Indian Regional Navigation Satellite System to Improve Dilution of Precision	313
<i>Schuster, W., and Ochieng, W.</i> Harmonisation of Category-III Precision Approach Navigation System Performance Requirements	569
<i>Tsou, M-C., Kao, S-L., and Su, C-M.</i> Decision Support from Genetic Algorithms for Ship Collision Avoidance Route Planning and Alerts	167
<i>Tsou, M-C.</i> Integration of a Geographic Information System and Evolutionary Computation for Automatic Routing in Coastal Navigation	323
<i>Tsou, M-C.</i> Discovering Knowledge from AIS Database for Application in VTS	449
<i>Tzannatos, E.</i> Human Element and Accidents in Greek Shipping	119
<i>Vepa, R.</i> Spacecraft Large Attitude Estimation Using a Navigation Sensor	89
<i>Vulfovich, B., and Fogilev, V.</i> New Ideas for Celestial Navigation in the Third Millennium	373
<i>Wang, N.</i> An Intelligent Spatial Collision Risk Based on the Quaternion Ship Domain	733
<i>Xu, Z., Li, Y., Rizos, C., and Xu, X.</i> Novel Hybrid of LS-SVM and Kalman Filter for GPS/INS Integration	289
<i>Yao, C., Zhengjiang, L., and Zhaolin, W.</i> Distribution Diagram of Ship Tracks Based on Radar Observation in Marine Traffic Survey	129
<i>Zhou, J., Knedlik, S., and Loffeld, O.</i> INS/GPS Tightly-coupled Integration using Adaptive Unscented Particle Filter	491

SUBJECT INDEX

Air Navigation:

- The Effect of Terrain Mask on RAIM Availability. *Tomislav Radišić, Doris Novak and Tino Bucak* 105
- Harmonisation of Category-III Precision Approach Navigation System Performance Requirements. *Wolfgang Schuster and Washington Ochieng* 569

Air Traffic Management:

- Strategic Conflict Detection and Resolution Using Aircraft Intent Information. *Marco Porretta, Wolfgang Schuster, Arnab Majumdar and Washington Ochieng* 61

Animal Navigation:

- Calibrating the Operational Beam Width and Maximum Range of a Ship Radar Used for Bird Observations. *Gudrun Hilgerloh, Tanja Caprano and Eva Maria Griebeler* 363

Collision Avoidance:

- An Intelligent Spatial Collision Risk Based on the Quaternion Ship Domain. *Ning Wang* 733

History:

- The Age of Sail: A Time when the Fortunes of Nations and Lives of Seamen Literally Turned with the Winds Their Ships Encountered at Sea. *William E. Carter and Merri S. Carter* 717
- Experiences with Compasses in the Mid-20th Century. *John Kemp* 545
- Heaving The Lead. *Lt Cdr R. W. Cooper RN FRIN* 183
- Journey to Work: James Cook's Transatlantic Voyages in the Grenville 1764-1767. *George Huxtable and Ian Jackson* 207

Integrated Navigation Systems:

- A Frequency-Domain INS/GPS Dynamic Response Method for Bridging GPS Outages. *Mohammed El-Diasty and Spiros Pagiatakis* 627
- INS/GPS Tightly-coupled Integration using Adaptive Unscented Particle Filter. *Junchuan Zhou, Stefan Knedlik and Otmar Loffeld* 491
- Neural Network Aided Adaptive Filtering and Smoothing for an Integrated INS/GPS Unexploded Ordnance Geolocation System. *Jong Ki Lee and Christopher Jekeli* 251
- Novel Hybrid of LS-SVM and Kalman Filter for GPS/INS Integration. *Zhenkai Xu, Yong Li, Chris Rizos and Xiaosu Xu* 289
- Receiver Interface Requirements for Deep INS/GNSS Integration and Vector Tracking. *Paul D. Groves and Christopher J. Mather* 471
- Tightly-coupled GPS/UWB Integration. *Glenn MacGougan, Kyle O'Keefe and Richard Klukas* 1

Interception Techniques:

- Nature Inspired Target Reacquisition Strategies for Autonomous Vehicles in a Search Role. *Alec Banks and Jonathan Vincent* 233

Land Navigation:

- Data on the Move – Privacy of Road Pricing. *Bart Custers and Albert Kuiper* 51
- Field Comparison of Driving Performance Using a Portable Navigation System. *Wen-Chen Lee, Mi-Chia Ma and Bor-Wen Cheng* 39
- Heuristic Drift Elimination for Personnel Tracking Systems. *Johann Borenstein and Lauro Ojeda* 591
- Land Vehicle Navigation with the Integration of GPS and Reduced INS: Performance Improvement with Velocity Aiding. *Songlai Han and Jinling Wang* 153
- Locata Performance Evaluation in the Presence of Wide- and Narrow-Band Interference. *Faisal A. Khan, Chris Rizos and Andrew G. Dempster* 527

- A Novel Initial Alignment Scheme for Low-Cost INS Aided by GPS for Land Vehicle Applications. *Songlai Han and Jinling Wang* 663
- Potential Benefits of GPS/GLONASS/GALILEO Integration in an Urban Canyon – Hong Kong. *Shengyue Ji, Wu Chen, Xiaoli Ding, Yongqi Chen, Chunmei Zhao and Congwei Hu* 681
- Simplified Dead Reckoning on a Tortuous Path. *David Robertson* 379
- Loran:**
- Improving Loran Coverage with Low Power Transmitters. *Sherman C. Lo, Benjamin B. Peterson, Tim Hardy and Per K. Enge* 23
- Marine Navigation:**
- Adding the Human Element to Ship Manoeuvring Simulations. *Karl Gunnar Aarsaether and Torgeir Moan* 695
- Alternative Sources of Energy in Shipping. *Fernández Soto J. L., Garay Seijo R., Fraguela Formoso J. A., Gregorio Iglesias G. and Carral Couce L* 435
- Decision Support from Genetic Algorithms for Ship Collision Avoidance Route Planning and Alerts. *Ming-Cheng Tsou, Sheng-Long Kao and Chien-Min Su* 167
- Discovering Knowledge from AIS Database for Application in VTS. *Ming-Cheng Tsou* 449
- Distribution Diagram of Ship Tracks Based on Radar Observation in Marine Traffic Survey. *Cai Yao, Liu Zhengjiang and Wu Zhaolin* 129
- Human Element and Accidents in Greek Shipping. *Ernestos Tzannatos* 119
- Integration of a Geographic Information System and Evolutionary Computation for Automatic Routing in Coastal Navigation. *Ming-Cheng Tsou* 323
- Navigational Traffic Conflict Technique: A Proactive Approach to Quantitative Measurement of Collision Risks in Port Waters. *Ashim Kumar Debnath and Hoong Chor Chin* 137
- Optimal Ship Routing with Ocean Current Included. *S. J. Bijlsma* 565
- Piracy at Sea: Somalia an Area of Great Concern. *Santiago Iglesias Baniela* 191
- The Risk Homeostasis Theory. *Santiago Iglesias Baniela and Capt. Juan Vinagre Rios* 607
- Navigation Practice:**
- Great Circle Navigation with Vectorial Methods. *Vincenzo Nastro and Urbano Tancredi* 557
- New Ideas for Celestial Navigation in the Third Millennium. *Boris Vulfovich and Vasily Fogilev* 373
- A Non-singular Horizontal Position Representation. *Kenneth Gade* 395
- Obituary:**
- Michael Richey MBE Hon FRIN 1917–2009. *David Broughton* 187
- Satellite Navigation Systems and Techniques:**
- Assessment of Radio Frequency Compatibility Relevant to the Galileo E1/E6 and Compass B1/B3 Bands. *Wei Liu, Gang Du, Xingqun Zhan and Chuanrun Zhai* 419
- Augmentation of Indian Regional Navigation Satellite System to Improve Dilution of Precision. *Achanta D. Sarma, Qudusa Sultana and Vemuri Satya Srinivas* 313
- Carrier Phase Relative RAIM Algorithms and Protection Level Derivation. *Livio Gratton, Mathieu Joergel and Boris Pervan* 215
- The Compact Network RTK Method: An Effective Solution to Reduce GNSS Temporal and Spatial Decorrelation Error. *Byungwoon Park and Changdon Kee* 343
- A Hybrid GNSS Integrity Design Leveraging a Priori Signal Noise Characteristics. *James DiLellio* 513
- Implementation of a Dual-Frequency GLONASS and GPS L1 C/A Software Receiver. *S. Abbasian Nik and M. G. Petovello* 269
- A New Method For DGPS Ambiguity Resolution. *Fabrizio Pierregentili and Emiliano Cordelli* 645
- Precise GPS Positioning with Low-Cost Single-Frequency System in Multipath Environment. *Abdulla Alnaqbi* 301
- Space:**
- Spacecraft Large Attitude Estimation Using a Navigation Sensor. *Ranjan Vepa* 89

THE JOURNAL OF NAVIGATION

Volume 63

2010

PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL
EDITED BY NORMAN HUGHES

THE ROYAL INSTITUTE OF NAVIGATION
AT THE ROYAL GEOGRAPHICAL SOCIETY
1 KENSINGTON GORE, LONDON SW7 2AT

THE ROYAL INSTITUTE OF NAVIGATION

PATRON

HRH THE PRINCE PHILIP DUKE OF EDINBURGH, KG, KT, OM

OFFICERS AND COUNCIL 2009–2010

PRESIDENT

D. H. Barnes

VICE PRESIDENTS

Prof. T. Moore

C. M. D. Beatty

HONORARY TREASURER

I. P. A. Stitt

CHAIRMAN OF THE TECHNICAL COMMITTEE

Prof. A. P. Norris

CHAIRMAN OF THE MEMBERSHIP & FELLOWSHIP COMMITTEE

Wg Cdr J. W. Lindsay

Other Members of Council

Gp Capt. C. S. Blount RAF

D. Cockburn

Dr N. D. Hughes OBE

Prof. W. Y. Ochieng

R. D. Pike

Ms C. Robinson

Capt I. A. Smith

J. B. Taylor OBE

G. L. White

Capt R. J. Wild

DIRECTOR

Capt P. C. Chapman-Andrews, LVO MBE

CONTENTS

Tightly-coupled GPS/UWB Integration	1
Glenn MacGougan, Kyle O'Keefe and Richard Klukas	
Improving Loran Coverage with Low Power Transmitters	23
Sherman C. Lo, Benjamin B. Peterson, Tim Hardy and Per K. Enge	
Field Comparison of Driving Performance Using a Portable Navigation System	39
Wen-Chen Lee, Mi-Chia Ma and Bor-Wen Cheng	
Data on the Move – Privacy of Road Pricing	51
Bart Custers and Albert Kuiper	
Strategic Conflict Detection and Resolution Using Aircraft Intent Information	61
Marco Porretta, Wolfgang Schuster, Arnab Majumdar and Washington Ochieng	
Spacecraft Large Attitude Estimation Using a Navigation Sensor	89
Ranjan Vepa	
The Effect of Terrain Mask on RAIM Availability	105
Tomislav Radišić, Doris Novak and Tino Bucak	
Human Element and Accidents in Greek Shipping	119
Ernestos Tzannatos	
Distribution Diagram of Ship Tracks Based on Radar Observation in Marine Traffic Survey	129
Cai Yao, Liu Zhengjiang and Wu Zhaolin	
Navigational Traffic Conflict Technique: A Proactive Approach to Quantitative Measurement of Collision Risks in Port Waters	137
Ashim Kumar Debnath and Hoong Chor Chin	
Land Vehicle Navigation with the Integration of GPS and Reduced INS: Performance Improvement with Velocity Aiding	153
Songlai Han and Jinling Wang	
Decision Support from Genetic Algorithms for Ship Collision Avoidance Route Planning and Alerts	167
Ming-Cheng Tsou, Sheng-Long Kao and Chien-Min Su	
Michael Richey MBE Hon FRIN 1917–2009	187
Piracy at Sea: Somalia an Area of Great Concern	191
Santiago Iglesias Baniela	
Journey to Work: James Cook's Transatlantic Voyages in the Grenville 1764–1767	207
George Huxtable and Ian Jackson	
Carrier Phase Relative RAIM Algorithms and Protection Level Derivation	215
Livio Gratton, Mathieu Joerger and Boris Pervan	
Nature Inspired Target Reacquisition Strategies for Autonomous Vehicles in a Search Role	233
Alec Banks and Jonathan Vincent	
Neural Network Aided Adaptive Filtering and Smoothing for an Integrated INS/GPS Unexploded Ordnance Geolocation System	251
Jong Ki Lee and Christopher Jekeli	
Implementation of a Dual-Frequency GLONASS and GPS L1 C/A Software Receiver	269
S. Abbasian Nik and M. G. Petovello	
Novel Hybrid of LS-SVM and Kalman Filter for GPS/INS Integration	289
Zhenkai Xu, Yong Li, Chris Rizos and Xiaosu Xu	
Precise GPS Positioning with Low-Cost Single-Frequency System in Multipath Environment	301
Abdulla Alnaqbi and Ahmed El-Rabbany	
Augmentation of Indian Regional Navigation Satellite System to Improve Dilution of Precision	313
Achanta D Sarma, Quddusa Sultana and Vemuri Satya Srinivas	
Integration of a Geographic Information System and Evolutionary Computation for Automatic Routing in Coastal Navigation	323
Ming-Cheng Tsou	
The Compact Network RTK Method: An Effective Solution to Reduce GNSS Temporal and Spatial Decorrelation Error	343
Byungwoon Park and Changdon Kee	
Calibrating the Operational Beam Width and Maximum Range of a Ship Radar Used for Bird Observations	363
Gudrun Hilgerloh, Tanja Caprano and Eva Maria Griebeler	
Simplified Dead Reckoning on a Tortuous Path	379
David Robertson	

A Non-singular Horizontal Position Representation	395
Kenneth Gade	
Assessment of Radio Frequency Compatibility Relevant to the Galileo E1/E6 and Compass B1/B3 Bands	
Wei Liu, Gang Du, Xingqun Zhan and Chuanrun Zhai	419
Alternative Sources of Energy in Shipping	
Fernández Soto J. L., Garay Seijo R., Fraguera Formoso J. A., Gregorio Iglesias G. and Carral Couce L.	435
Discovering Knowledge from AIS Database for Application in VTS	
Ming-Cheng Tsou	449
Receiver Interface Requirements for Deep INS/GNSS Integration and Vector Tracking	
Paul D. Groves and Christopher J. Mather	471
INS/GPS Tightly-coupled Integration using Adaptive Unscented Particle Filter	
Junchuan Zhou, Stefan Knedlik and Otmar Loffeld	491
A Hybrid GNSS Integrity Design Leveraging a <i>Priori</i> Signal Noise Characteristics	
James DiLellio	513
Locata Performance Evaluation in the Presence of Wide- and Narrow-Band Interference	
Faisal A. Khan, Chris Rizos and Andrew G. Dempster	527
Experiences with Compasses in the Mid-20th Century	
John Kemp	545
Great Circle Navigation with Vectorial Methods	
Vincenzo Nastro and Urbano Tancredi	557
Harmonisation of Category-III Precision Approach Navigation System Performance Requirements	
Wolfgang Schuster and Washington Ochieng	569
Heuristic Drift Elimination for Personnel Tracking Systems	
Johann Borenstein and Lauro Ojeda	591
The Risk Homeostasis Theory	
Santiago Iglesias Baniela and Capt. Juan Vinagre Ríos	607
A Frequency-Domain INS/GPS Dynamic Response Method for Bridging GPS Outages	
Mohammed El-Diasty and Spiros Pagiatakis	627
A New Method For DGPS Ambiguity Resolution	
Fabrizio Piergentili and Emiliano Cordelli	645
A Novel Initial Alignment Scheme for Low-Cost INS Aided by GPS for Land Vehicle Applications	
Songlai Han and Jinling Wang	663
Potential Benefits of GPS/GLONASS/GALILEO Integration in an Urban Canyon – Hong Kong	
Shengyue Ji, Wu Chen, Xiaoli Ding, Yongqi Chen, Chunmei Zhao and Congwei Hu	681
Adding the Human Element to Ship Manoeuvring Simulations	
Karl Gunnar Aarsæther and Torgeir Moan	695
The Age of Sail: A Time when the Fortunes of Nations and Lives of Seamen Literally Turned with the Winds Their Ships Encountered at Sea	
William E. Carter and Merri S. Carter	717
An Intelligent Spatial Collision Risk Based on the Quaternion Ship Domain	
Ning Wang	733
FORUM	
Heaving The Lead	
Lt Cdr R. W. Cooper RN FRIN	183
New Ideas for Celestial Navigation in the Third Millennium	
Boris Vulfovich and Vasily Fogilev	373
Optimal Ship Routing with Ocean Current Included	
S. J. Bijlsma	565
Author Index	751
Subject Index	753

THE ROYAL INSTITUTE OF NAVIGATION

Aims and Objects

The objects of the Institute are to unite in one body those who are concerned with or who are interested in navigation and to further its development. Navigation is conceived as applying to locomotion of all kinds and is perceived as encompassing aspects of: command and control, psychology and zoology, operational research, risk analysis, theoretical physics, operation in hostile environments, instrumentation, ergonomics, financial planning and law as well as electronics, astronomy, mathematics, cartography and other subjects traditionally associated with navigation.

The aims of the Institute are to encourage the creation and dissemination of knowledge through research and development, to co-ordinate information from all the disciplines involved, to provide a forum in which new ideas and new products can have the benefit of informed and professional scrutiny and to further education and communication.

The Institute initiates conferences and symposia on specific subjects and has a programme of meetings at which lectures are given and discussed. There are standing Special Interest Groups (SIGs) which keep under constant review pertinent aspects of navigation. The success of these Special Interest Groups is crucially dependent on the active involvement of members.

The SIGS include: Animal Navigation Group (ANG), Civil and Military Aviation Group (CMAG), General Aviation Navigation Group (GANG), History of Air Navigation Group (HANG), Land Vehicle Navigation Group (LVNG), Marine Traffic Navigation Group (MTNG), Navigation On Foot (NOF), Small Craft Group (SCG) and Satellite Special Interest Group (SATSIG).

The Institute publishes *The Journal of Navigation* four times a year. It contains papers which have been presented at meetings, other original papers and selected papers and reports from Special Interest Groups. The Institute also publishes *Navigation News* six times a year which contains a full account of the Institute's proceedings and activities. This includes Branch News, a record of current navigational work, a diary of events, topical articles, news about Membership and advertising. A great deal of the Institute's work is international in character and is co-ordinated with that of similar organizations in other countries.

Membership

There are seven classes of Membership of the Institute:

(1) HONORARY FELLOWS: Distinguished persons upon whom the Council may see fit to confer an honorary distinction.

(2) FELLOWS: Members, of at least three years' standing, holding certain qualifications laid down in the by-laws; these qualifications include having made a contribution of value to navigation.

(3) ASSOCIATE FELLOWS: Individuals who satisfy the Council of their high level of professional achievement or experience in the advancement of navigation operations, concepts or equipment.

(4) MEMBERS: Persons over twenty-one years of age who satisfy the Council of their interest in navigation.

(5) STUDENT MEMBERS: Persons under twenty-five years of age studying at a recognized school or university with a view to making navigation, or an allied interest, their career.

(6) CORPORATE MEMBERS: Organizations such as universities, navigation schools, government departments or companies, here and abroad, who are directly or indirectly interested in the science of navigation. Corporate Members are entitled to send representatives to all Institute meetings and to receive six copies of its publications. They are encouraged to take an active part in the Institute's work. Applications should be sent by letter addressed to the Director.

(7) RETIRED MEMBERS: Fellows or Members of 65 years of age or over who have paid no fewer than 6 annual subscriptions.

There is also Associateship of the Institute, which gives entitlement of Membership to one Special Interest Group SIG, but not to receipt of the *Journal of Navigation*.

Subscriptions

Annual subscriptions to the Institute are payable in advance as follows (prices are inclusive of vat):

Fellows	£128
Associate Fellows	£123
Members	£118
Student Members	£15

THE JOURNAL OF NAVIGATION

VOLUME 63 NUMBER 4 OCTOBER 2010

CONTENTS

Harmonisation of Category-III Precision Approach Navigation System Performance Requirements	569
<i>Wolfgang Schuster and Washington Ochieng</i>	
Heuristic Drift Elimination for Personnel Tracking Systems	591
<i>Johann Borenstein and Lauro Ojeda</i>	
The Risk Homeostasis Theory	607
<i>Santiago Iglesias Baniela and Capt. Juan Vinagre Ríos</i>	
A Frequency-Domain INS/GPS Dynamic Response Method for Bridging GPS Outages	627
<i>Mohammed El-Diasty and Spiros Pagiatakis</i>	
A New Method For DGPS Ambiguity Resolution	645
<i>Fabrizio Piergentili and Emiliano Cordelli</i>	
A Novel Initial Alignment Scheme for Low-Cost INS Aided by GPS for Land Vehicle Applications	663
<i>Songlai Han and Jinling Wang</i>	
Potential Benefits of GPS/GLONASS/GALILEO Integration in an Urban Canyon – Hong Kong	681
<i>Shengyue Ji, Wu Chen, Xiaoli Ding, Yongqi Chen, Chunmei Zhao and Congwei Hu</i>	
Adding the Human Element to Ship Manoeuvring Simulations	695
<i>Karl Gunnar Aarsæther and Torgeir Moan</i>	
The Age of Sail: A Time when the Fortunes of Nations and Lives of Seamen Literally Turned with the Winds Their Ships Encountered at Sea	717
<i>William E. Carter and Merri S. Carter</i>	
An Intelligent Spatial Collision Risk Based on the Quaternion Ship Domain	733
<i>Ning Wang</i>	
Author Index	751
Subject Index	753

Cambridge Journals Online

For further information about this journal
please go to the journal website at:
journals.cambridge.org/nav



Mixed Sources
Product group from well-managed
forests and other controlled sources
www.fsc.org Cert no. SA-COC-1527
© 1996 Forest Stewardship Council

CAMBRIDGE
UNIVERSITY PRESS