
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: Land Navigation and Location Group (LN&L), General Aviation Navigation Group (GANG), History of Air Navigation Group (HANG), Civil and Military Air Group (CMAG), Marine Traffic & Navigation Group (MT&NG), Small Craft Group (SCG), Space Group (Space), Animal Navigation Group (ANG) and Research & Development Group (R&D).

The Institute publishes *The Journal of Navigation* six 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 coordinated with that of similar organisations in other countries.

Membership

There are nine classes of membership under which individuals or organisations may apply to join the Institute. Details of the various membership criteria and current subscriptions are available on the RIN website (Home / Join the RIN / Membership Types <http://www.rin.org.uk/general.aspx?ID=59>) and from the Membership Secretary (membership@rin.org.uk Tel: +44(0)20 7591 3130 Fax: 44(0)20 7591 3131).

- (1) Ordinary Membership
- (2) Associate Membership
- (3) Associate Fellow Membership
- (4) Student Membership
- (5) Junior Associate Membership
- (6) Corporate Membership
- (7) Small Business Membership
- (8) Affiliate College University Membership
- (9) Affiliate Club Membership

Additional membership classes of Fellowship, Honorary Fellowship, Retired Membership and Affiliate Membership also exist and details are available from the Membership Secretary.

The subscription price (excluding VAT) to *The Journal* (ISSN 0373-4633) for Volume 70, 2017, which includes print and electronic access, is £604 (USA, Canada and Mexico US \$1092) and includes delivery by air; single parts are available at £110 (USA, Canada and Mexico US \$197) plus postage. The electronic-only price available to institutional subscribers is £468 (USA, Canada and Mexico US \$854). EU subscribers (outside the UK) who are not registered for VAT should add VAT at their country's rate. VAT registered subscribers should provide their VAT registration number. *The Journal* is issued free to all Members of the Institute. Orders, which must be accompanied by payment, may be sent to any bookseller or subscription agent or direct to the publishers: Cambridge University Press, UPH, Shaftesbury Road, Cambridge CB2 8BS, or in the USA, Canada and Mexico to Cambridge University Press, Journals Fulfillment Department, 1 Liberty Plaza, Floor 20, New York, NY 10006, USA. Japanese prices for institutions are available from Kinokuniya Company Ltd, P.O. Box 55, Chitose, Tokyo 156, Japan.

© 2017 The Royal Institute of Navigation

This journal issue has been printed on FSC-certified paper and cover board. FSC is an independent, non-governmental, not-for-profit organization established to promote the responsible management of the world's forests. Please see www.fsc.org for information.

THE JOURNAL OF NAVIGATION

VOLUME 70 NUMBER 6 NOVEMBER 2017

CONTENTS

- Seamless Indoor-Outdoor Navigation based on GNSS, INS and Terrestrial Ranging Techniques** 1183
Wei Jiang, Yong Li, Chris Rizos, Baigen Cai and Wei Shangquan
- Effect of Inaugurating the Third Set of Locks in the Panama Canal on Vessel Size, Manoeuvring and Lockage Time** 1205
Luis Carral, Javier Tarrío-Saavedra, Salvador Naya, Johnny Bogle and Rodolfo Sabonge
- In-motion Alignment for Low-cost SINS/GPS under Random Misalignment Angles** 1224
Xiao Cui, Chunbo Mei, Yongyuan Qin, Gongmin Yan and Qiangwen Fu
- Determining the Coordinates of Control Points in Hydrographic Surveying by the Precise Point Positioning Method** 1241
Burak Akpınar and Nedim Onur Aykut
- Tightly Combined BeiDou B2 and Galileo E5b Signals for Precise Relative Positioning** 1253
Mingkui Wu, Xiaohong Zhang, Wanke Liu, Shaojie Ni and Shun Yu
- Improving DGPS Accuracy by Considering the Correlation of Pseudorange Correction and Satellite Elevation Angle** 1267
Sang-Hyeon Kim and Kwan-Dong Park
- Multi-resolution Visual Positioning and Navigation Technique for Unmanned Aerial System Landing Assistance** 1276
Chong Yu, Jiyuan Cai and Qingyu Chen
- Multi-AUV Cooperative Target Search Algorithm in 3-D Underwater Workspace** 1293
Xiang Cao and A-long Yu
- Web MCA-based Decision Support System for Incident Situations in Maritime Traffic: Case Study of Adriatic Sea** 1312
Nenad Mladineo, Marko Mladineo and Snjezana Knezic
- Integration of Star and Inertial Sensors for Spacecraft Attitude Determination** 1335
Kedong Wang, Tongqian Zhu, Yujie Qin, Chao Zhang and Yong Li
- In-motion Alignment Algorithm for Vehicle Carried SINS Based on Odometer Aiding** 1349
Haijian Xue, Xiaosong Guo, Zhaofa Zhou and Kunming Wang
- Maritime Traffic Analysis of the Strait of Istanbul based on AIS data** 1367
Yigit C. Altan and Emre N. Otoy
- Vessel Spatio-temporal Knowledge Discovery with AIS Trajectories Using Co-clustering** 1383
Jiang Wang, Cheng Zhu, Yun Zhou and Weiming Zhang
- Improved Concise Backstepping Control of Course Keeping for Ships Using Nonlinear Feedback Technique** 1401
XianKu Zhang, Guangping Yang, Qiang Zhang, Guoqing Zhang and Yuqi Zhang
- A novel SINS/CNS Integrated Navigation Method Using Model Constraints for Ballistic Vehicle Applications** 1415
Dingjie Wang, Hanfeng Lv and Jie Wu

Cambridge Core

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



MIX
Paper from
responsible sources
FSC® C007785

CAMBRIDGE
UNIVERSITY PRESS