

## Table of Contents

TransNav 2009 – Review of scientists and professionals meeting in the field of safety of navigation and sea transportation	XV
<i>Foreword to the Monograph</i> <i>A. Weintrit &amp; T. Neumann</i>	
List of reviewers	XXI
Message from The President of The Nautical Institute	XXV

### Chapter 1. Safety of navigation

1.1 The present and expected changes in maritime safety, security and defense functions <i>J. Urbański, W. Morgaś &amp; M. Mięsikowski</i>	3
1.2 Study on ships safety control system <i>X.-J. Han, X.-Y. Meng &amp; Z.-W. Wang</i>	9
1.3 Marine navigation using expert system <i>N. Nikitakos &amp; G. Fikaris</i>	13
1.4 Safety of navigation and spatial planning at sea <i>J. Hajduk</i>	23
1.5 e-Navigation and the Human Element <i>D. Patraiko, P. Wake &amp; A. Weintrit</i>	29
1.6 Generation of Electronic Nautical Chart data for assessment of navigational safety in harbour and waterway design <i>K. Guan, C. Shi, S. Wu &amp; T. Xu</i>	35
1.7 Study on shipping safety strategy based on accident forecast model <i>X.Y. Meng, Y.M. Bai &amp; X.J. Han</i>	41
1.8 Knowledge representation in a ship's navigational decision support system <i>Z. Pietrzykowski &amp; J. Uriasz</i>	45

### Chapter 2. Manoeuvring and ship-handling simulation

2.1 Manoeuvring simulation on the bridge for predicting motion of real ships and as training tool in ship handling simulators <i>K. Benedict, M. Kirchhoff, M. Gluch, S. Fischer &amp; M. Baldauf</i>	53
2.2 CFD based hull hydrodynamic forces for simulation of ship manoeuvres <i>T. Tabaczek, T. Górnicz &amp; J. Kulczyk</i>	59
2.3 New capabilities of the NTPRO 4000 full mission ship handling simulator in the assessment and evaluation processes at Lithuanian Maritime Academy <i>R. Zažeckis, I. Bartusevičienė &amp; R. Maksimavičius</i>	63
2.4 Reconstructing a marine casualty: The effectiveness of the full-mission simulator as a casualty analysis tool <i>E. Doyle</i>	69

2.5 Fuzzy fast time simulation model of ship's manoeuvring <i>P. Zalewski</i>	75
2.6 Ship manoeuvring performance experiments using a free running model ship <i>N. Im &amp; J.-H. Seo</i>	79
2.7 Simulation of load distribution along a quay during unparallel berthing manoeuvres <i>J. Artyszuk</i>	85
2.8 Training course for personnel involved in emergency towing operations <i>T.E. Berg, G. Gudmundseth &amp; U. Klevstad</i>	93

### *Chapter 3. Global navigation satellite system*

3.1 Modernization of maritime DGPS in Poland <i>M. Dziewicki</i>	103
3.2 Application of 3-D velocity measurement of vessel by VI-GPS for STS lightering <i>Y. Yoo, E. Pedersen, K. Tatsumi, N. Kouguchi &amp; Y. Arai</i>	107
3.3 Positioning using GPS and GLONASS systems <i>L. Kujawa, J.B. Rogowski &amp; K. Kopańska</i>	113
3.4 Galileo integrity concept and its applications to the maritime sector <i>C. Hernández, C. Catalán &amp; M.A. Martínez</i>	117
3.5 Galileo AltBOC E5 signal characteristics for optimal tracking algorithms <i>F. Vějražka, P. Kovář &amp; P. Kačmařík</i>	123
3.6 The implementation of the EGNOS system to APV-I precision approach operations <i>A. Fellner, K. Banaszek &amp; P. Tróminski</i>	127
3.7 GPS-based vehicle localisation <i>A. Janota &amp; V. Končelík</i>	135
3.8 Effect of measurement duration on the accuracy of position determination in GPS and GPS/EGNOS systems <i>R. Bober, T. Szewczuk &amp; A. Wolski</i>	141

### *Chapter 4. Marine traffic control and automatic identification systems*

4.1 Sustainability of motorways of the sea and fast ships <i>F.X. Martínez de Osés &amp; M. Castells i Sanabra</i>	149
4.2 Applying graph theory terms to description of VTS <i>K. Jackowski</i>	153
4.3 Simulation-based risk analysis of maritime transit traffic in the Strait of Istanbul <i>B. Ozbas, I. Or, O.S. Uluscu &amp; T. Altok</i>	157
4.4 The Marine Electronic Highway project in Straits of Malacca and Singapore: Observation on the present development <i>M.H. Said &amp; A.H. Saharuddin</i>	163
4.5 Availability of traffic control system based on servicing model <i>J. Mikulski</i>	167

4.6	Evaluation of main traffic congestion degree for restricted waters with AIS reports <i>Q. Hu, J. Yong, C. Shi &amp; G. Chen</i>	173
4.7	Computer vision and ship traffic analysis: Inferring maneuver patterns from the automatic identification system <i>K.G. Aarsæther &amp; T. Moan</i>	177
4.8	Possible method of clearing-up the close-quarter situation of ships by means of Automatic Identification System <i>V.M. Bukaty &amp; S.U. Morozova</i>	183

### *Chapter 5. Navigational tools, systems and equipment*

5.1	Development of a concept for bridge alert management <i>F. Motz, S. Höckel, M. Baldauf &amp; K. Benedict</i>	191
5.2	Comparison of traditional and integrated bridge design with SAGAT <i>F. Motz, E. Dalinger, H. Widdel, S. Höckel &amp; S. MacKinnon</i>	197
5.3	The problem of “infant mortality” failures of integrated navigation systems <i>S. Ahvenjärvi</i>	203
5.4	CRM-203 type Frequency Modulated Continuous Wave (FM CW) radar <i>S. Plata &amp; R. Wawruch</i>	207
5.5	The impact of windmills on the operation of radar systems <i>M. Džunda, V. Humeňanský, D. Draxler, Z. Csefalvay &amp; P. Bajusz</i>	211
5.6	3D Sonar for navigation and obstacle avoidance <i>I. Bowles &amp; Z. Markowski</i>	215
5.7	The problem of magnetic compass deviation at contemporary conditions <i>E.M. Lushnikov</i>	219
5.8	The basic research for the new compass system using latest MEMS <i>G. Fukuda &amp; S. Hayashi</i>	221
5.9	Development of decision supporting tools for determining tidal windows for deep-drafted vessels <i>K. Eloit, M. Vantorre, J. Richter &amp; J. Verwilligen</i>	227

### *Chapter 6. Anti-collision*

6.1	Behaviour patterns in crossing situations <i>J. Kemp</i>	237
6.2	Method of safe returning of the vessel to planned route after deviation from collision <i>M. Tsymbal &amp; I. Urbansky</i>	243
6.3	A study of marine incidents databases in the Baltic Sea Region <i>A. Mullai, E. Larsson &amp; A. Norrman</i>	247
6.4	The display mode for choosing the manoeuvre for collision avoidance <i>L. Vagushchenko &amp; A. Vagushchenko</i>	253
6.5	Defining of minimally admitted head-on distance before the ships start maneuvering <i>V.M. Bukaty &amp; E.N. Dimitrieva</i>	257
6.6	Collision scenario-based cognitive performance assessment for marine officers <i>H. Kim, H.-J. Kim &amp; S. Hong</i>	261

6.7	The effects of causation probability on the ship collision statistics in the Gulf of Finland <i>M. Hänninen &amp; P. Kujala</i>	267
6.8	An influence of the order to maintain minimum distance between successive vessels on the vessel traffic intensity in the narrow fairways <i>L. Kasyk</i>	273
6.9	On determination of the head-on situation under Rule 14 of COLREG-72 <i>V.M. Bukaty &amp; S.U. Morozova</i>	277

## *Chapter 7. Communication at sea*

7.1	Maritime communication to support safe navigation <i>K.E. Fjørtoft, B. Kvamstad &amp; F. Bekkadal</i>	285
7.2	Some radiocommunication aspects of e-Navigation <i>K. Korcz</i>	291
7.3	On-board communication challenges (LAN, SOA and wireless communication) <i>L. Mu &amp; N. Garmann-Johnsen</i>	297
7.4	Towards standardized maritime language for communication at sea <i>B. Katarzyńska</i>	303
7.5	Novel maritime communications technologies <i>F. Bekkadal</i>	307
7.6	Advantages of preservation of obligatory voice communication on the VHF radio channel 16 <i>S. Brzóška</i>	313
7.7	The transmission of the information of the system of telecommunicational DECT in the trans-shipping terminal <i>A. Kuśmińska-Fijałkowska &amp; Z. Łukasik</i>	317

## *Chapter 8. Manouvering and pilot navigation*

8.1	Navigational safety in SPM (Single Mooring Point) regions <i>V. Paulauskas</i>	325
8.2	Identification of ship maneuvering model using extended Kalman filters <i>C. Shi, D. Zhao, J. Peng &amp; C. Shen</i>	329
8.3	Estimating manoeuvres safety level of the Unity Line m/f “Polonia” ferry at the Port of Ystad <i>A. Kowalski</i>	335
8.4	Conceptual model of port security simulating complex (Bulgarian Standpoint) <i>B. Mednikarov, N. Stoyanov &amp; K. Kalinov</i>	341
8.5	Problem of stopping vessel at the waypoint for full-mission control autopilot <i>L. Morawski &amp; V. Nguyen Cong</i>	347
8.6	On the control of CPP ships by steering during in-harbour ship-handling <i>H. Yabuki &amp; Y. Yoshimura</i>	353
8.7	New Black Sea Terminal of port Kulevi and it navigating features <i>A. Gegenava, N. Varshanidze &amp; G. Khaidarov</i>	359

8.8 Analysis of the influence of current on the manoeuvres of the turning of the ship on the ports turning-basins <i>J. Kornacki</i>	365
---	-----

### *Chapter 9. Sea-river and inland navigation*

9.1 Satellite and terrestrial radionavigation systems on European inland waterways <i>J. Januszewski</i>	373
9.2 Electronic reporting of ships in the RIS system <i>A. Lisaj</i>	379
9.3 The criterion of safety navigation assessment in sea-river shipping <i>W. Galor</i>	383
9.4 Target tracking in RIS <i>A. Stateczny &amp; W. Kazimierski</i>	387
9.5 Six in one or one in six variants. Electronic navigational charts for open sea, coastal, off-shore, harbour, sea-river and inland navigation <i>A. Weintrit</i>	393
9.6 Data transmission in inland AIS system <i>P. Wolejsza</i>	405

### *Chapter 10. Route planning and weather navigation*

10.1 Multi-objective optimization of motor vessel route <i>S. Marie &amp; E. Courteille</i>	411
10.2 Application of the 1-2-3 rule for calculations of a vessel's route using evolutionary algorithms <i>B. Wiśniewski, P. Medyna &amp; J. Chomski</i>	419
10.3 Multicriteria optimisation in weather routing <i>J. Szlapczyńska &amp; R. Śmierchalski</i>	423
10.4 On the fuel saving operation for coastal merchant ships using weather routing <i>K. Takashima, B. Mezaoui &amp; R. Shoji</i>	431
10.5 Solving multi-ship encounter situations by evolutionary sets of cooperating trajectories <i>R. Szlapczyński</i>	437
10.6 Evolutionary sets of cooperating trajectories in multi-ship encounter situations – Use cases <i>R. Szlapczyński</i>	443

### *Chapter 11. Hydrometeorological aspects*

11.1 Contemporary problems of navigation nearly pole <i>E.M. Lushnikov</i>	451
11.2 A case study from an emergency operation in the Arctic Seas <i>B. Kvamstad, K.E. Fjørtoft, F. Bekkadal, A.V. Marchenko &amp; J.L. Ervik</i>	455
11.3 Ice conditions and human factors in marine accidents at the Arctic <i>N. Marchenko</i>	461
11.4 Sea ice services in the Baltic Sea <i>M. Sztobryn</i>	467

11.5	Low sea level occurrence of the southern Baltic Sea coast <i>I. Stanisławczyk, B. Kowalska &amp; M. Mykita</i>	473
11.6	Measurement system for wind and waves characteristics registration on the Silm Lake <i>L. Morawski, J. Pomirski, P. Sikora &amp; R. Sokół</i>	479
11.7	Simplified method for estimating maximum ship's draught when navigating in shallow water on the south of Stolpe Bank in the aspect of the vessels with maximum dimensions and draught <i>G. Rutkowski &amp; A. Królikowski</i>	483
11.8	Asymptotic theory of ship motions in regular waves under shallow water conditions <i>Y.L. Vorobyov &amp; M.S. Stasenko</i>	493

## Chapter 12. Methods and algorithms

12.1	Stabilization of fractional positive continuous-time linear systems in sectors of left-hand half complex plane by state-feedbacks <i>T. Kaczorek</i>	501
12.2	The comparison of safe control methods in marine navigation in congested waters <i>J. Lisowski</i>	507
12.3	A numerical study of combined natural and Marangoni convection in a square cavity <i>K. Cicek &amp; A. Cihat Baytas</i>	517
12.4	An application of mathematical theory of evidence in navigation <i>W. Filipowicz</i>	523
12.5	The $H_2$ and robust $H_{inf}$ regulators applied to multivariable ship steering <i>W. Gierusz</i>	531
12.6	Speciation of population in neuroevolutionary ship handling <i>M. Łacki</i>	541
12.7	Equalization of the measurements of the altitude, the azimuth and the time from observation of passages of celestial bodies <i>P. Bobkiewicz</i>	547
12.8	Programmatic correction of errors of measuring track processing <i>M. Luft, E. Szychta &amp; R. Cioc</i>	551
12.9	Alternative for Kalman filter – Two dimension self-learning filter with memory <i>A. Fellner, K. Banaszek &amp; P. Tróminski</i>	557

## Chapter 13. Safety and reliability of technical systems

13.1	Managing and predicting maritime and off-shore risk <i>R.B. Duffey &amp; J.W. Saull</i>	563
13.2	Transportation system architecture for intelligent management <i>J. Szpytko</i>	571
13.3	Risk analysis and human factor in prevention of CRG casualties <i>L. Kobyliński</i>	577
13.4	Estimation of the probability of propulsion loss by a seagoing ship based on expert opinions <i>A. Brandowski &amp; W. Frąckowiak</i>	583

13.5	Finite discrete Markov model of ship safety <i>L. Smolarek</i>	589
13.6	The possibility of application of algorithms indicating maximum paths in directed graphs for modeling of the evacuation process <i>D.H. Łozowicka</i>	593

#### *Chapter 14. Marine transportation*

14.1	Maritime transport development in the global scale – The main chances, threats and challenges <i>A.S. Grzelakowski</i>	599
14.2	Maritime safety in European concept of the internalization of external costs of transport <i>M. Matczak</i>	607
14.3	e-Maritime: An enabling framework for knowledge transfer and innovative information services development across the waterborne transport sector <i>J. Graff</i>	611
14.4	Challenges for Polish seaports' development in the light of globalisation processes in maritime transport <i>A. Przybyłowski</i>	617
14.5	An analysis of marine navigation and safety of sea transportation by Iranian women as officer and master mariner <i>H. Yousefi</i>	623
14.6	Modelling support for maritime terminals planning and operation <i>S. Ricci &amp; C. Marinacci</i>	627
14.7	Turkish maritime transport policy (1960–2008) <i>M. Kadioglu</i>	637
14.8	The influence of organic polymer on parameters determining ability to liquefaction of mineral concentrates <i>M. Popek</i>	645
14.9	Application of thermal analysis and trough test for determination of the fire safety of some fertilizers containing nitrates <i>K. Kwiatkowska-Sienkiewicz &amp; P. Kałucka</i>	651

#### *Chapter 15. Human factors and crew resource management*

15.1	Problem behaviours among children of Filipino seafarers in Iloilo City, Philippines <i>V.B. Jaleco, M.G. Gayo, Jr., R.L. Pador &amp; R.A. Alimen</i>	659
15.2	Predicting emotional intelligence in maritime management: Imperative, yet elusive <i>E.S. Potoker &amp; J.-A. Corwin</i>	663
15.3	Officers' shortage: Viewpoints from stakeholders <i>G. Eler, J. Calambuhay, L. Bernas &amp; M. Magramo</i>	669
15.4	A noble profession called seafaring: The making of an officer <i>M. Magramo &amp; L. Gellada</i>	673
15.5	Officers as prostitutes: Myth or reality? (A study on poaching of officers in the Philippines) <i>M. Magramo, G. Eler, J. Calambuhay &amp; L. Bernas</i>	679

15.6	The economical emigration aspect of East and Central European seafarers: Motivation for employment in foreign fleet <i>V. Senčičla, I. Bartusevičienė, L. Rupšienė &amp; G. Kalvaitienė</i>	683
15.7	The role of the maritime institutions on the shortage of officers <i>M. Magramo, L. Bernas, J. Calambuhay &amp; G. Eler</i>	689
15.8	Psychological features of seamen's activity in emergency situations <i>V.A. Bondarev &amp; O.M. Bondareva</i>	693

### *Chapter 16. Maritime education and training*

16.1	Maritime education – putting in the right emphasis <i>A. Ali</i>	699
16.2	Correlation between academic performance in Auxiliary Machinery 2 subject and navigational trip among marine engineering students at maritime university in the Philippines <i>R.A. Alimen, V.B. Jaleco, R.L. Pador &amp; M.G. Gayo, Jr.</i>	703
16.3	Higher performance in maritime education through better trained Lecturers <i>R. Hanzu-Pazara, P. Arsenie &amp; L. Hanzu-Pazara</i>	707
16.4	Mentoring and the transfer of experiential knowledge in today's merchant fleet <i>A.L. Le Goubin</i>	713
16.5	Stakeholder satisfaction: Research evaluation of marine engineering cadets' performance at Maritime University, Philippines <i>R.A. Alimen, M. Gayo, Jr. &amp; V.B. Jaleco</i>	719
16.6	Project PRACNAV for a better on board training curricula <i>E. Barsan &amp; C. Muntean</i>	725
16.7	A new tool for evaluating and training of chemical tanker crew: Seafarer evaluation and training software: DEPEDES (SETS) <i>O. Arslan, O. Gurel &amp; M. Kadioglu</i>	731
16.8	MET system in Ukraine <i>M.V. Miyusov &amp; D.S. Zhukov</i>	735

### *Chapter 17. Maritime policy, proposals and recommendations*

17.1	The Somali piracy new or old challenge for international community <i>D. Duda &amp; T. Szubrycht</i>	743
17.2	The importance of the educational factor to assure the safe and security on the sea <i>L.C. Stan &amp; N. Buzbuchi</i>	751
17.3	Standard for quality assurance: The case of Philippine Maritime College <i>A.C. Doromal</i>	755
17.4	Novelties in the development of the qualification standards for electro-technical officers under STCW convention requirements <i>J. Wyszowski, J. Mindykowski &amp; R. Wawruch</i>	761
17.5	Assessment of ISPS code compliance at ports using cognitive maps <i>M. Celik &amp; Y. Ilker Topcu</i>	771

17.6	Dynamic component of ship's heeling moment due to sloshing vs. IMO IS-code recommendations <i>P. Krata</i>	775
17.7	The influence of the flooding damaged compartment on the metacentric height ship type 888 <i>W. Mironiuk</i>	781
17.8	Intelligent evaluation system of ship management <i>Q. Xu, X. Meng &amp; N. Wang</i>	787
	Round Table Panel Session	
	GNSS and Safety and Security of Marine Navigation	791
	Author index	793