

SHIPS AND SHIP ROUTINES AND CONSTRUCTION



ROBERT PINTO



SHIPS AND SHIP ROUTINES AND CONSTRUCTION

Editor
Robert Pinto



**DISCOVERY PUBLISHING HOUSE
INDIA**

CONTENTS

<i>Preface</i>	<i>v</i>
Chapter 1 Aerodynamic Analysis and Design of High-Performance Sails	1
Sean P. Caraher, Garth V. Hobson and Max F. Platzer	
Chapter 2 Management of Nutrient-Rich Wastes and Wastewaters on Board of Ships	15
Céline Vaneeckhaute	
Chapter 3 Human Resource Management in National Shipping	25
Prasadja Ricardianto and Imam Sonny	
Chapter 4 Systems and Operation of Ballast Water in Ships with the Changing Ballast Water Management Policy	43
Eleyadath Lakshmi, Machinchery Priya and Velayudhan Sivanandan Achari	
Chapter 5 Biological Propulsion Systems for Ships and Underwater Vehicles	59
Naga Praveen Babu Mannam and P. Krishnankutty	
Chapter 6 Crack Assessment Criteria for Ship Hull Structure based on Ship Operational Life	89
Ajit Nair, K. Sivaprasad and C.G. Nandakumar	
Chapter 7 An Autonomous Path Planning Model for Unmanned Ships Based on Deep Reinforcement Learning	105
Siyu Guo, Xiuguo Zhang, Yisong Zheng and Yiquan Du	
Chapter 8 Ship Classification and Anomaly Detection Based on Spaceborne AIS Data Considering Behavior Characteristics	147
Zhenguo Yan , Xin Song , Hanyang Zhong, Lei Yang and Yitao Wang	
Chapter 9 Numerical Calculation of High-Strength-Steel Saddle Plate Forming Suitable for Lightweight Construction of Ships	169
Shun Wang, Jinliang Dai, Ji Wang, Rui Li, Jiayan Wang and Zhikang Xu	
Chapter 10 Lightweight Small Ship Detection Algorithm Combined with Infrared Characteristic Analysis for Autonomous Navigation	197
Zongjiang Gao, Yingjun Zhang and Shaobo Wang	

Chapter 11	Feeder Losses Analysis of Marine Vessel Power Systems: A Case Study of Container Ship Power Loss Analysis Using Newton–Raphson Method	215
	Ching-Jin Chen, Chun-Lien Su, Jen-Hao Teng and Mahmoud Elsis	
Chapter 12	A Lightweight Radar Ship Detection Framework with Hybrid Attentions	229
	Nanjing Yu, Haohao Ren, Tianmin Deng and Xiaobiao Fan	
	Index	251

INDEX

A

Active Substance 50
Actor-Critic (AC) algorithm 107, 112
Actual load ratio 226
Actual navigation process 106, 110
Adjacent feature fusion (AFF) 230
Aerial locomotion 60
American Bureau of Shipping [ABS] 94
Anaerobic digestion 21, 22
Angular deformation 180
Angular momentum 67
Anomaly Detection 147, 163
Anomaly detection method 147, 149, 152, 165
Ansys Parametric Design Language (APDL) 177
Aquatic animals 59
Aquatic environment 15
Aquatic locomotion 60, 85
Artificial intelligence technology 106
Artificial neural networks (ANNs) 217
Artificial potential field (APF) 108
Attention-based feature fusion scheme (AFFS) 229, 232, 246
Automatic identification system (AIS) 105, 116, 147, 148, 166
Autonomous path planning 105, 106, 107, 108, 109, 110, 115, 119, 123, 125, 126, 128, 136, 137, 139, 141, 143
Autonomous surface ships 60
Autonomous surface vehicles (ASV) 108

B

Balistiform 62

Ballast Water 43, 46, 47, 48, 49, 50, 51, 52, 56, 57
Ballast water discharge 43, 45, 46, 47
Ballast water exchange 43, 46, 47, 48, 49, 50, 53, 54, 55
Ballast water exchange standard 46
Ballast water pollution 46
Ballast Water Treatment 43, 49, 56
Ballast water treatment systems 48, 49
Baltic Sea 15, 16, 17, 18, 23, 24
Beetle antenna search (BAS) 109
Bioinspired Propulsors 59
Bio-invasion 43, 46, 49, 55
Biological diversity 16
Biological locomotion 59
Biological oxygen demand (BOD5) 20
Biological results 52
Block assembly 95
Body-caudal fin (BCF) 62

C

Carbon dioxide emissions 170
Cargo ships 1, 3, 13, 150, 151, 154, 155, 156, 157, 159, 160, 161, 163, 165
Centralized anaerobic digestion 21
Charge-coupled device (CCD) 76
Chi-square statistic 51
Circular Data Visualization Technique 89
Cluster Systematic Sampling 30
Collision Avoidance 105
Comminution 17, 19
Competitive sailing 1, 2, 12
Complex weld geometry 93
Computational analysis 1, 2
Computational domain 5, 12

Computational fluid dynamics (CFD) 64, 70
 Confirmatory Factor Analysis (CFA) 31
 Constant circulation 69
 Convolutional Neural Network (CNN) 230
 Course over ground (COG) 119
 Crack Assessment Criteria 89, 94, 96
 Crack growth 89, 91, 92, 95, 101, 102
 Crack initiation 89, 90, 91, 92, 93, 94, 95, 96,
 97, 99, 100, 101, 102
 Critic network 107, 112, 113, 114, 116, 117,
 125, 137

D

Daewoo shipbuilding & marine engineering
 (DSME) 54
 Data Acquisition Systems (DAQs) 34
 Data mining 148, 149, 150, 151, 152
 Decision behavior 110
 Deep deterministic policy gradient (DDPG)
 105
 Deep Learning (DL) 106
 Deep neural networks (DNN) 110
 Deep Q-Network (DQN) 107
 Deep Reinforcement Learning 105, 110, 144,
 145, 146
 Deflection distribution 183, 188
 Delft University of Technology (DUT) 54
 Democratic leadership 27
 Democratic style 28, 32
 Detectable cracks 89
 Deterministic Policy Gradient (DPG) 107
 Digital Fluoroscopy 59
 Domain size 5
 Drag bucket 8, 9
 Drag coefficient 67
 Dry weight (DW) 17

E

Edge velocity field 10, 11
 Efficiency Existing Ship Index (EEXI) 216
 Efficient channel attention (ECA) 234
 Elasto-plastic matrix 175
 Electrical maintenance 26
 Employee engagement 25, 26, 27, 28, 29, 30,
 31, 32, 33, 34, 35, 36, 38, 39, 40, 41
 Employee job satisfaction 27
 Employee performance appraisal 25
 Energy Efficiency Design Index (EEDI) 216
 Energy Ship 1, 13
 Environmental impact 59

Esociform fish 62
 Eutrophication 16
 Experience Replay Memory 115

F

Fabrication 91, 95, 96, 97
 Feature fusion pyramid network and DRL
 (FFPN-RL) 109
 Feature pyramid network (FPN) 199, 232,
 234
 Fiber reinforced plastic (FRP) 83
 Finite thickness 3
 Fishing ships 150, 151, 154, 155, 156, 157,
 158, 159, 161, 163, 165
 Fish-like propulsion 59, 65
 Flame heat source 172
 Flapping foil 59, 63, 64, 65, 66, 67, 70, 73, 74,
 85, 86, 87
 Flapping motion 67
 Flow cytometry 52
 Flow transitions 9
 Fluid momentum 68
 Food Waste 15, 17
 Food waste management 19, 20
 Forensic Investigation 89
 Fossorial locomotion 60
 Fragile ecological system 89
 Free stream velocity 65

G

Gamma Theta transition 7
 Gamma Transform 197, 204
 Gaussian distribution 173
 Geometrical misalignment 93, 101
 Global Environment Facility (GEF) 46
 Global positioning system (GPS) 116
 Grayscale distribution 203
 Gymnotiform 62

H

High-performance sailboat design 3
 High Performance Sails 1
 Histogram-based pure background
 classification (HPBC) 231
 Holographic microscopy 52
 Human-accelerated eutrophication 16
 Human resource management 26
 Human Resources Division 25
 Hybrid attention feature fusion module
 (HAFFM) 229, 232, 246
 Hybrid Attention Mechanism 230

- Hybrid attention residual module (HARM) 229, 232, 233, 246
- Hydrodynamic efficiency 63
- Hypothetical test 26
- I**
- Ideal influence 27
- Inadequate strength 92, 100
- Individual consideration 27
- Induce camber 5
- Inducement Factor 89
- Infrared Target 197
- Inspirational motivation 28
- Integrated ship design 26
- Integrated system 26
- Intellectual Stimulation 27
- Intermittency Momentum Thickness 7
- International Air Pollution Prevention certificate (IAPP) 216
- International Energy Efficiency Certificate (IEEC) 216
- International Maritime Organization (IMO) 16, 148
- International Safety Management Code 26
- Invasion risk 47
- Inventory conventional management 15
- J**
- Japan Transport Safety Board [JTSB] 90
- Jet mode propulsion 60
- K**
- K-nearest neighbor (KNN) algorithm 151
- Knowledge-based particle filter (KB-PF) 151
- L**
- Laminar flow 9, 10, 11
- Large-Scale SAR Ship Detection Dataset-v1.0 (LS-SSDD-v1.0) 230, 237
- Leadership style 26, 27, 32, 38, 40
- Lightweight Construction 169
- Line heating process 171, 173, 174, 175, 176, 177, 183, 194, 195
- Liquefied natural gas (LNG) 170
- Long-term accumulation index 111
- M**
- Marine Accidents Investigation Branch [MAIB] 90
- Marine biodiversity 46
- Marine ecosystems 15, 16, 22
- Marine environment 16
- Marine environmental protection 51
- Marine environment protection committee (MEPC) 45
- Marine pollution 43, 45, 46, 49
- Marine Vessel Power System 216
- Maritime domain 111
- Maritime mobile service identification (MMSI) 152
- Maritime safety supervision 148
- Maritime Surveillance 147
- Maritime transportation 16
- Median-paired fin (MPF) 62
- MEPC (Marine Environment Protection committee) 50
- Merchant ships 197
- Mesh division 177
- Micro aerial vehicles 60
- Microsoft Foundation Classes (MFC) 128
- Modern ship 25, 26, 27, 34, 35, 36
- Multi-head self-attention (MHSA) 234
- Multiple hybrid attentions ship detector (MHASD) 229, 232, 246
- N**
- National Advisory Committee for Aeronautics airfoil section 72
- Navigation control 106, 109
- Node displacement vector 176
- Non Destructive Examination (NDE) 92
- Nonlinear transformation 204
- Numerous circumnavigations 5
- Nutrient pollution 15
- Nutrient-rich waste 16
- Nutrient-rich waste management 16
- O**
- Ocean big data analysis 152
- Ocean deoxygenation 16, 22
- Ocean warming-induced deoxygenation 16
- Odor pollution 17
- Online training 113, 143
- Optimal strategy 111
- Organic waste sources 16, 18
- Ornstein-Uhlenbeck (OU) process 118
- Oscillation frequency 68
- Ostraciiform group 62

P

- Particle image velocimetry (PIV) 59, 76
- Passenger ships 148, 151, 154, 155, 156, 157, 159, 160, 161, 163, 165
- Path aggregation network (PAN) 231
- Pathogenic aquatic organisms 46
- Pivot point 65
- Plastic deformation 182
- Plate Forming 169
- Port reception 18, 19, 20, 22, 24
- Port reception facilities (PRFs) 18
- Power management system (PMS) 223
- Propulsive Efficiency 59
- Propulsive wave 62
- Protective coating 97
- Proximal policy optimization (PPO) 110
- Pulse amplitude modulated fluorometry 52
- Python language 125

Q

- Quad-feature pyramid network (Quad-FPN) 230
- Quantitative method 25

R

- Random forest (RF) 158
- Rate of turn (ROT) 153
- Regions with convolutional neural network (R-CNN) 199
- Reinforcement Learning (RL) 106
- Reynolds-averaged Navier-Stokes equations (RANSE) 64
- Rich ship navigation information 152
- Rigid wing 1, 2, 3, 4
- Risk assessment 43, 49, 50, 53, 55

S

- Saddle plate forming 171, 174, 177, 178, 184
- Sail Aerodynamics 1
- Sail thrust 2
- Sampling design 51
- SAR Ship Detection Dataset (SSDD) 230, 237
- Satellite signal transmission 153
- Sea-sky line (SSL) detection 199
- Sea water 45, 49
- Sediment disposal procedures 48
- Sensitive species 16
- Sewage sludge 18, 21

- Shear Stress Transport model (SST) 7
- Ship Action Controller 115, 116, 117
- Ship anomaly detection 151
- Ship automation 106
- Ship behavior analysis 148, 151
- Shipbuilding Management 25
- Ship buoyancy control method 54
- Ship Classification 147, 159, 161
- Ship constructing yard 94
- Ship construction 169, 170
- Ship-generated waste discharge 17
- Ship monitoring 148, 149
- Ship Navigation Information Fusion Module 115, 116, 117
- Ship operation 26
- Ship path planning method 106
- Ship performance 26
- Shipping industry 18
- Ship policy 19
- Ship structural integrity 89
- Signal-to-clutter ratio (SCR) 205
- Single shot multibox detector (SSD) 199
- Skin friction coefficients 9, 10
- Speed over ground (SOG) 119
- Steel ship 89
- Stereo microscope 52
- Stipulated treatment technology 48
- Stress concentration 93, 94, 95, 103
- Strouhal number 61, 63
- Structural Equation Modeling 25, 30
- Sun-synchronous orbits (SSO) 152
- Support vector machine (SVM) 151, 158
- Surface pressure coefficients 9
- Surface ship model 68, 79, 80, 81, 86
- Swimming movement 62
- Synthetic Aperture Radar (SAR) 230

T

- Tanker ships 154, 155, 157, 159, 160, 161, 163, 165
- Terrestrial locomotion 60
- Tetraodoniform 62
- Thermal elastic-plastic process 175
- Time-consuming 52
- Total feeder loss 226
- Traditional path planning 106, 110, 143
- Transformational leadership 25, 26, 27, 30, 31, 32, 33, 34, 35, 36, 37, 40, 41
- Treatment technology 50
- Tug ship 155
- Turbulence modeling 6, 7

Turbulent kinetic energy 6, 7
Twin-Skin Sail 1

U

Underwater vehicle (UV) 64
Unmanned surface vehicles (USV) 108
Utrecht Work Engagement Scale (UWES)
29

V

Vacuum breaker (VCB) 221
Valorisation 15
Variational recurrent neural networks
(VRNNs) 151
Vertical velocity 6, 7

Visual inspection 52
Vorticity 7
Vorticity contour 69

W

Wastewater purification systems 19, 20
Wastewater treatment systems 20, 22
Wave pressure 97
Welding process 93
Work Effectiveness 25, 27, 29, 30, 33, 34, 35
Work-Life Balance 25, 29, 30, 33, 36, 40, 41
Work quality 27
Work suitability 27

Z

Zebra mussel invasion 46