

PROCEEDINGS OF SPIE

Eighth International Conference on Traffic Engineering and Transportation System (ICTETS 2024)

**Xiantao Xiao
Jia Yao**
Editors

**20–22 September 2024
Dalian, China**

Organized by
Dalian University of Technology (China)

Sponsored by
AEIC—Academic Exchange Information Centre (China)

Published by
SPIE

Volume 13421

Part One of Two Parts

Proceedings of SPIE 0277-786X, V. 13421

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

The papers in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIDigitalLibrary.org.

The papers reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from these proceedings:

Author(s), "Title of Paper," in *Eighth International Conference on Traffic Engineering and Transportation System (ICTETS 2024)*, edited by Xiantao Xiao, Jia Yao, Proc. of SPIE 13421, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510686281

ISBN: 9781510686298 (electronic)

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time)

SPIE.org

Copyright © 2024 Society of Photo-Optical Instrumentation Engineers (SPIE).

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of fees. To obtain permission to use and share articles in this volume, visit Copyright Clearance Center at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher.

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

Publication of record for individual papers is online in the SPIE Digital Library.

**SPIE. DIGITAL
LIBRARY**

SPIDigitalLibrary.org

Paper Numbering: A unique citation identifier (CID) number is assigned to each article in the Proceedings of SPIE at the time of publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

- The first five digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc. The CID Number appears on each page of the manuscript.

Contents

xvii *Conference Committee*

Part One

TRANSPORTATION INFRASTRUCTURE CONSTRUCTION AND PERFORMANCE RESEARCH

- 13421 02 **Attention distribution of pedestrians during street crossings: impacts of facility and environment** [13421-229]
- 13421 03 **Design of traffic signal timing schemes for intersections based on vehicle spatio-temporal trajectories** [13421-112]
- 13421 04 **Research on aerodynamic performance of a two-stage flapping wing vehicle** [13421-212]
- 13421 05 **Reconstruction and operational direction schedules of mine lanes with mixed-mine truck flow for efficiency improvement** [13421-243]
- 13421 06 **Study on drivers' visual characteristics under visual composite elements at highway tunnel entrance section** [13421-26]
- 13421 07 **Design and application of high-pile structure liquid bulk cargo terminal based on BIM technology** [13421-189]
- 13421 08 **A study of a typical deep gorge wind field characteristics** [13421-111]
- 13421 09 **Performance study of transportation projects based on the presence-absence comparison method: a case study of the “starlight project” in Tongxiang city** [13421-53]
- 13421 0A **Comprehensive safety evaluation of continuous downhill slope based on multilevel fuzzy mathematical analysis** [13421-145]
- 13421 0B **Leakage analysis of dredger reamer excavation based on numerical simulation of rotating flow field** [13421-256]
- 13421 0C **Application of BIM and UAV 3D reality modeling technology in highway engineering construction** [13421-5]
- 13421 0D **Safety evaluation study of small pitch sections of tunnel connection interchange based on driving simulation** [13421-8]
- 13421 0E **P2.5 hybrid commercial vehicle based on the speed layered control strategy** [13421-80]
- 13421 0F **YOLOv8-PCD: a pavement crack detection method based on enhanced feature fusion** [13421-178]

- 13421 OG **Co-simulation analysis of autonomous rail rapid transit and its roads based on TruckSim-Simulink-PreScan** [13421-132]
- 13421 OH **Analysis of Three Gorges ship lift fast channel role play** [13421-270]
- 13421 OI **Analysis of vehicle speed characteristics in transition zone during the construction period of highway reconstruction and expansion** [13421-87]
- 13421 OJ **Optimization design of space connection scheme for air-rail intermodal transport** [13421-232]
- 13421 OK **Modal analysis of metro curved track structures** [13421-52]
- 13421 OL **EEXI assessment and retrofit case study of an 81,000 DWT bulk carrier** [13421-255]
- 13421 OM **Research overview of building information modeling standards** [13421-236]
- 13421 ON **Overall design and modeling of college formula racing** [13421-17]
- 13421 OO **The influence of front seat backrest angle difference on whiplash test evaluation** [13421-18]
- 13421 OP **Optimization analysis of concrete girder bridge maintenance based on genetic algorithm** [13421-106]
- 13421 OQ **Research on skid resistance performance of long downhill tunnels in mountainous expressways** [13421-70]
- 13421 OR **The impact of AR-HUD lane enhancement on lateral control performance under fog conditions** [13421-253]
- 13421 OS **Research on optimization of parameters for excavation and smooth blasting boreholes in mountain tunnels** [13421-129]
- 13421 OT **Research on tunnel defect detection based on YOLOv8 model** [13421-138]
- 13421 OU **The assessment study of the airport operation compatibility for the new aircraft design** [13421-68]
- 13421 OV **Study on the influence of full row layout of two bays on container wind resistance based on CFD** [13421-39]
- 13421 OW **Effect of wheel polygonal wear on axle fatigue life** [13421-196]
- 13421 OX **Influence of abnormal wheel/rail contact and aerodynamic loads on the operational performance of high-speed train** [13421-188]

- 13421 0Y **Study on the length of composite interchange weaving area of super multi-lane expressway** [13421-46]
- 13421 0Z **Study on the supply-demand balance of electric vehicle charging facilities: a case study of Shenzhen** [13421-45]
- 13421 10 **Research on the analysis and prediction of pavement crack causes based on particle swarm optimization neural network technology** [13421-199]
- 13421 11 **Characteristic impedance analysis of the soft failure due to mechanical stress on high-speed cables in vehicle applications** [13421-268]
- 13421 12 **Integration of anti-slip design at subway station entrances and exits with medium and low-speed maglev technology** [13421-182]
- 13421 13 **Joint optimization of variable speed limits and locations for highway on-ramp bottlenecks** [13421-163]
- 13421 14 **The weight adjustment of the statistical method of highway freight transport volume under the major and intermediate road maintenance conditions** [13421-122]
- 13421 15 **Research on foreign object detection on highways based on improved YOLO in harsh weather** [13421-260]
- 13421 16 **Numerical simulation study on temperature field of underwater tunnel fire** [13421-154]
- 13421 17 **Research on the damage of the frame caused by wheel rail impact load under different track parameters** [13421-272]
- 13421 18 **Research on polygon formation mechanism of metro vehicles based on wheel-rail coupled vibration** [13421-167]
- 13421 19 **Research on intelligent support technology for railway surrounding environments based on high-resolution remote sensing change monitoring** [13421-251]

INTELLIGENT TRAFFIC ACCIDENT DETECTION AND RISK ANALYSIS

- 13421 1A **Research on vehicle detection algorithm based on YOLOv5s-ShuffleNetV2-SE-EIOU** [13421-170]
- 13421 1B **Analysis of traffic accident influencing factors in plateau areas based on the Apriori algorithm** [13421-185]
- 13421 1C **An urban road vehicle detection method based on Swin transformer** [13421-230]
- 13421 1D **AIS-based method for extracting the process of ship collision avoidance** [13421-127]
- 13421 1E **Research on regional signal control algorithm based on multi-agent DDQN** [13421-61]

- 13421 1F **Border effect in metropolitan area with household travel survey data** [13421-249]
- 13421 1G **A maneuvering velocity obstacle algorithm for ship collision avoidance** [13421-124]
- 13421 1H **Autonomous collision avoidance method for inland river unmanned vessels based on backward reachable set** [13421-85]
- 13421 1I **Ship trajectory fusion method based on minimum variance principle** [13421-234]
- 13421 1J **Study on the crashworthiness of aluminum honeycombs under axial and oblique impact** [13421-100]
- 13421 1K **Improving the key point detection algorithm for railway operations based on YOLOv7-tiny** [13421-114]
- 13421 1L **Lightweight highway debris detection algorithm based on improved YOLOv8n** [13421-95]
- 13421 1M **Improved YOLOv8 for effective ship detection in occluded backgrounds** [13421-110]
- 13421 1N **Recognition of vessel types based on YOLOv8** [13421-58]
- 13421 1O **Identification of critical conditions for pedestrian-vehicle game modes at non-signalized crosswalks based on MCMC** [13421-99]
- 13421 1P **Research on intelligent scheduling model of cigarette transportation based on batch management and cost control optimization** [13421-233]
- 13421 1Q **Preliminary flight conflict detection using speed obstacle method based on SVM** [13421-7]
- 13421 1R **Research on an airport gate pre-assignment method based on two-stage optimization algorithm** [13421-149]
- 13421 1S **Connectivity reliability assessment for maritime nodes: a novel D-vine copula-based approach** [13421-177]
- 13421 1T **Research on the impact mechanism of airport operation based on life cycle theory** [13421-50]
- 13421 1U **Extracting trip demand for static demand responsive transit service based on taxi trips** [13421-197]
- 13421 1V **A research of guidance signs adjustment based on naturalistic driving study data** [13421-250]
- 13421 1W **Multi-ship collision risk assessment based on DBSCAN algorithm** [13421-130]

- 13421 1X **Detection of high-speed railway driver fatigue across shifts scheduling** [13421-205]
- 13421 1Y **Vehicle dynamic risk assessment at intersections based on gravitational model** [13421-187]
- 13421 1Z **Analyzing multi-agent training strategies for enhanced EV charging recommendations**
[13421-248]
- 13421 20 **Cause analysis of road freight accidents based on the CAST-Accimap method** [13421-139]
- 13421 21 **Data-driven estimation of driving distance for battery electric bus with multisource real-world data** [13421-51]
- 13421 22 **Data collection and target tracking using event cameras in space traffic management**
[13421-157]
- 13421 23 **Evaluation of public and private traffic safety performance under regional perspective differences in China** [13421-203]
- 13421 24 **An evaluation method of departure flight normal rate** [13421-30]
- 13421 25 **Robust optimization of vessel scheduling under dual uncertainties** [13421-237]
- 13421 26 **Dynamic pickup and delivery problem considering electric vehicle charging and driver fatigue** [13421-161]
- 13421 27 **Research on the establishment of a highway disease database based on integrated detection and maintenance** [13421-209]
- 13421 28 **Transportation scheduling algorithm for underground mines based on sparrow search algorithm optimized genetic algorithm** [13421-193]
- 13421 29 **Conflict detection and resolution for unmanned aerial vehicles (UAVs) based on prime factorization** [13421-24]
- 13421 2A **Research on urban low-altitude UAV conflict detection method based on matrix Hadamard product calculation** [13421-15]
- 13421 2B **Association mining of factors affecting truck traffic accidents based on improved Apriori algorithm** [13421-10]
- 13421 2C **Analyzing toll station capacity impacted by Haizhuwan Tunnel's toll collection model**
[13421-198]
- 13421 2D **UTD-YOLO: a novel YOLO for uncovered truck detection** [13421-179]
- 13421 2E **Bridge crack image classification based on improved transformer** [13421-81]
- 13421 2F **Blockchain-based federated learning for Internet of Vehicles** [13421-118]

- 13421 2G **Deep reinforcement learning-based dynamic green wave control strategy** [13421-84]
- 13421 2H **BDS/VIO integrated navigation method based on improved unscented Kalman filter**
[13421-23]
- 13421 2I **Traffic risk identification methods for the Tibet highway under the impact of typical sudden disasters** [13421-238]
- 13421 2J **An integrated freight traffic assignment model for multimodal transport: a super-network approach addressing commodity and mode competition in large-scale regions**
[13421-148]
- 13421 2K **Risk assessment of underground road accidents based on driver behavior preferences**
[13421-150]

INTELLIGENT TRANSPORTATION SYSTEM MODELING AND OPTIMIZATION SCHEDULING

- 13421 2L **Design of electric vehicle braking system** [13421-92]
- 13421 2M **Design of state inspection system for small targets on railway wagons based on video detection** [13421-126]
- 13421 2N **Research on the symbiotic evolution of airport supply and demand based on green development** [13421-32]
- 13421 2O **Unmanned boat LiDAR simulation and virtual verification platform research** [13421-120]
- 13421 2P **Construction method of environmental pure electric vehicles in Northern China: a case study of Beijing** [13421-49]
- 13421 2Q **Research on automatic planning method of green departure flight procedure in complex terrain airports** [13421-181]
- 13421 2R **Research on the new generation of AI intelligent analysis system based on highway video data** [13421-73]
- 13421 2S **Research on the accessibility of rural transportation in the context of rural revitalization: a case study of Jiang'an** [13421-22]
- 13421 2T **New lane detection method for autonomous driving** [13421-231]
- 13421 2U **Vibration modal analysis of wheel-rail coupling system for metro vehicles** [13421-57]
- 13421 2V **Study on the setting method of non-motorized vehicle secondary crossing waiting area in Shijiazhuang City** [13421-98]

- 13421 2W **Preliminary concept of urban air route intersection operation for UAV** [13421-86]
- 13421 2X **Systematic evaluation of lane-change risk for multi-vehicle types on freeways using high-resolution data** [13421-221]
- 13421 2Y **Research on the hazards of SAS failures and fault injection techniques in the FTC system of unmanned SBW vehicles** [13421-224]
- 13421 2Z **Development of digital image processing program for ship lock monitoring based on MATLAB app designer** [13421-94]
- 13421 30 **Research on the framework of digital standard system for engineering projects of transportation construction enterprises** [13421-235]
- 13421 31 **Design of traffic light control system based on fuzzy control** [13421-65]
- 13421 32 **Low-carbon-based optimization of container terminal consolidation and evacuation network** [13421-186]
- 13421 33 **Review of electromagnetic interference formation mechanisms and suppression methods in high-speed train traction drive systems** [13421-78]
- 13421 34 **Investigation of the contributing factors of driver takeover time under conditional autonomous driving conditions** [13421-269]
- 13421 35 **Dynamic scheduling of multi-UAV system for regional passenger flow monitoring** [13421-263]

Part Two

- 13421 36 **Research on the testing of navigate-on-autopilot system based on ramp scenario** [13421-137]
- 13421 37 **Multi-objective hub airport siting without capacity constraints** [13421-213]
- 13421 38 **Research on the reliability of ship systems based on fuzzy FMECA** [13421-72]
- 13421 39 **Lane changing yielding motion model of connected and automated vehicles for emergency vehicles priority on highways** [13421-208]
- 13421 3A **A framework of fire evolution simulation for expressway** [13421-21]
- 13421 3B **Application of foundation models for autonomous driving: a survey of data synthesis** [13421-217]
- 13421 3C **Exploration of electromechanical digital development innovation and application enabled by business data of highway electromechanical maintenance platform** [13421-165]

- 13421 3D **3D object detection in autonomous driving: matching point cloud clustering with neural network classification** [13421-218]
- 13421 3E **Optimization of dispatch in urban aerial taxi sharing systems** [13421-97]
- 13421 3F **The construction method of traffic violation knowledge question answering system based on BERT-CRF model** [13421-44]
- 13421 3G **Identification and optimization of urban public transportation corridors based on OD flow clustering: a case study of Qingdao** [13421-2]
- 13421 3H **Study on the operational indicators of non-motorized vehicle secondary crossing waiting areas** [13421-159]
- 13421 3I **Design of LQR control law for hybrid electric propulsion system based on engine IOL** [13421-202]
- 13421 3J **Design and stability analysis of driving safety field for CAV** [13421-47]
- 13421 3K **Design of driver fatigue warning system based on facial multi-feature fusion** [13421-12]
- 13421 3L **The overall architecture and safety distance algorithm design of automobile ACC system** [13421-77]
- 13421 3M **Coordination assessment and optimization of airport hubs and integrated transportation networks** [13421-273]
- 13421 3N **Research on key technology of onboard carbon capture system (OCCS)** [13421-55]
- 13421 3O **Vibration and fatigue analysis of metro frame based on sensitivity analysis modal correction method** [13421-59]
- 13421 3P **Flight scheduling based on node influence of complex network** [13421-91]
- 13421 3Q **Accuracy evaluation of direct tire pressure monitoring system based on artificial intelligence** [13421-102]
- 13421 3R **Digital construction and practice of highway laboratories** [13421-74]
- 13421 3S **Construction and analysis of the three-dimensional flight conflict network model** [13421-128]

INTELLIGENT TRAFFIC FLOW PREDICTION AND CONGESTION MANAGEMENT

- 13421 3T **Short-term inbound passenger flow prediction for urban rail transit by integrating spatiotemporal features** [13421-123]

- 13421 3U **Research on real-time traffic communication prediction method based on vehicle ad-hoc network technology** [13421-41]
- 13421 3V **Evaluation of urban road network control methods under congested conditions** [13421-25]
- 13421 3W **Research on identification of congestion points at highway intersections and optimization of congestion alleviation** [13421-36]
- 13421 3X **Analysis of traffic operation and safety characteristics of highway continuous entrance section** [13421-207]
- 13421 3Y **Intermittent bus lane control method based on dynamic clearance** [13421-16]
- 13421 3Z **Research on the road traffic accident prediction based on SARIMA-LSTM model** [13421-71]
- 13421 40 **Optimization method for saturation state arterial signal control based on historical signal light color data** [13421-152]
- 13421 41 **Optimisation of traffic congestion model based on improved RIME** [13421-206]
- 13421 42 **The emergency vehicle signal priority control method for intersections considering pedestrian crossing safety** [13421-184]
- 13421 43 **Traffic scheduling algorithm with time constraint based on proximal policy optimization (PPO) algorithm** [13421-31]
- 13421 44 **Efficient and accurate fine grained trip identification for metro passengers from cellular trajectory data** [13421-13]
- 13421 45 **Research on intelligent prediction method of dynamic deformation modulus of roadbed** [13421-246]
- 13421 46 **Urban road operating speed prediction model based on IPSO-BiLSTM** [13421-219]
- 13421 47 **Data pre-integration in graph-transformer networks for enhanced spatiotemporal ridership prediction** [13421-162]
- 13421 48 **Short-time traffic flow combination prediction based on CEEMDAN-PE-IGWO-BIGRU** [13421-147]
- 13421 49 **Road congestion caused identification algorithm based on the image morphology and decision tree** [13421-172]
- 13421 4A **Detection of red light running behavior of two-wheeled motor vehicles at intersections** [13421-33]
- 13421 4B **Resilience evaluation model of urban road network based on betweenness centrality** [13421-143]

- 13421 4C **Influence of urban road layout form on the traffic efficiency of the road network** [13421-67]
- 13421 4D **Intersection traffic flow detection based on DSL-YOLOv5+DeepSORT area classification detection** [13421-169]
- 13421 4E **Simulation design of traffic flow prediction based on genetic optimization support vector machine** [13421-252]
- 13421 4F **Investigation on the impact of combined sight induction facilities inside highway tunnels on vehicle operation characteristics** [13421-6]
- 13421 4G **Multi-objective optimization of collaborative scheduling for inland river port** [13421-244]
- 13421 4H **Research on traffic control technology during the construction period of special long tunnels based on digital twins** [13421-28]
- 13421 4I **Attention-based feature extraction and fusion for autonomous vehicle trajectory prediction** [13421-108]
- 13421 4J **Research on traffic operation characteristics of highway accident area based on collaborative early warning** [13421-104]
- 13421 4K **Statistical method for long-term station flow prediction under foreseeable events** [13421-156]
- 13421 4L **Adaptive event-triggered predictive control method for the autonomous berthing of inland ships** [13421-141]
- 13421 4M **Study on flow demand forecasting of arterial highways under sparse road network conditions: a case study of Shanshan-Kumish project** [13421-136]
- 13421 4N **Study on the scale adaptability of the Xinjiang highway network** [13421-242]
- 13421 4O **Research on delay model of right-turning vehicle at intersections considering probability of yield-to-pedestrian: a case study of an intersection in Guangzhou** [13421-96]
- 13421 4P **Research on the prediction of polygonal wear of metro wheels** [13421-174]
- 13421 4Q **Travel time characteristics of subway passenger flow and short-time passenger flow forecast** [13421-245]
- 13421 4R **Prediction of urban rail transit scale based on cluster analysis** [13421-60]
- 13421 4S **Research on the application of neural network in the prediction of metro vehicle noise** [13421-228]
- 13421 4T **Research on urban traffic congestion identification based on machine learning** [13421-62]

- 13421 4U **Research on traffic flow characteristics of superhighway sections based on HighD dataset** [13421-194]
- 13421 4V **Multi-agent event triggering in a limited time high-speed train group coordinated cruise control** [13421-90]
- 13421 4W **Traffic flow forecasting in smart cities with deep learning** [13421-158]
- 13421 4X **Research on UAV intelligent inspection technology in urban rail transit** [13421-27]
- 13421 4Y **Emergency recognition method for rail transit based on TextCBAM network** [13421-226]
- 13421 4Z **Research on subway passenger flow prediction based on bp neural network** [13421-11]

INTELLIGENT LOGISTICS PLANNING AND TRANSPORTATION PATH OPTIMIZATION

- 13421 50 **Impact of the Earth rotation compensation on visual-inertial SLAM** [13421-14]
- 13421 51 **Optimizing fresh food delivery routes for cost reduction and green logistics** [13421-180]
- 13421 52 **Workforce planning for last-mile delivery: incorporating multi-period dynamics and postponed deliveries** [13421-93]
- 13421 53 **Adaptive eco-trajectory strategies for connected and automated heavy vehicles on freeways** [13421-140]
- 13421 54 **Three-stage vertical parking path planning for low-intelligence vehicles in standardized garages** [13421-83]
- 13421 55 **A logistics network sorting center volume prediction optimisation method** [13421-63]
- 13421 56 **A study of unmanned vehicle trajectory tracking based on nonsingular terminal sliding mode** [13421-29]
- 13421 57 **Research on influencing factors of collaborative participation of pluralistic subjectivity in emergency logistics system based on block chain technology based on ISM model** [13421-105]
- 13421 58 **Integrated scheduling optimization for air taxi service** [13421-37]
- 13421 59 **AGS-DelayLink: dependence analysis between airport ground service subprocess and flight departure delay** [13421-43]
- 13421 5A **Analysis and algorithm improvement of the shortest path critical turning problem in urban road networks** [13421-240]

- 13421 5B **Analysis of vehicle path optimisation in rural green logistics** [13421-82]
- 13421 5C **Research on the intrinsic mechanism of national logistics hub selection** [13421-88]
- 13421 5D **Research on network optimization of vehicle parts pickup with task sharing under the background of shared logistics** [13421-103]
- 13421 5E **Real-time vehicle dynamic path reconstruction algorithm based on AVI checkpoint data** [13421-247]
- 13421 5F **Research on optimization of warehouse operation management based on logistics rhythm** [13421-168]
- 13421 5G **Optimization of freight flow allocation and decision making for high-speed rail express services considering freight-dedicated train** [13421-34]
- 13421 5H **Optimization design of truck-mounted drone vehicle route considering consumer replenishment demand** [13421-151]
- 13421 5I **Research on multi-objective dynamic vehicle pickup and delivery route planning based on customer value** [13421-190]
- 13421 5J **A path planning approach for multi-task AGV based on deep reinforcement learning and ant colony algorithm** [13421-171]
- 13421 5K **Construction and evaluation of regional smart logistics index: a case study of Anhui province** [13421-109]
- 13421 5L **Demand exploitation and route optimization design of rail transit feeder based on shared bicycle orders** [13421-183]
- 13421 5M **Digital transformation path and benefits expectation analysis in highway industry** [13421-3]
- 13421 5N **Emergency multimode transportation path optimization based on modified customized non-dominated sorting genetic algorithm II** [13421-175]
- 13421 5O **Phased berthing trajectory planning method based on Bezier curves for inland vessels** [13421-142]
- 13421 5P **Trajectory optimization for passenger and freight trains on a single-track railway line** [13421-146]
- 13421 5Q **Research on multi-objective intermodal transportation of grain in China considering quality changes** [13421-89]
- 13421 5R **Optimization of O2O orders delivery path based on deep reinforcement learning** [13421-211]
- 13421 5S **Emergency vehicle rescue route optimization based on deep reinforcement learning in highway network** [13421-19]

- 13421 5T **Bidirectional heterogeneous fleet vehicle routing problem with three-dimensional loading constraints for sales-recycling scenario** [13421-64]
- 13421 5U **Ant colony algorithm-based path planning for drone cargo transportation in remote areas** [13421-113]
- 13421 5V **Information sharing in a supply chain for green products with supplier encroachment** [13421-4]
- 13421 5W **Algorithm for the robust shortest path problem with multimodal transportation** [13421-257]
- 13421 5X **Study on the evolution of navigation risk of ships carrying dangerous goods in inland river** [13421-192]
- 13421 5Y **Location-routing problem optimization of intra-city emergency reserves based on community gridding** [13421-261]
- 13421 5Z **Research on integrated optimization of urban logistics cargo loading and transportation paths** [13421-35]
- 13421 60 **Research on passenger travel path selection based on regional railway integration** [13421-153]
- 13421 61 **Research on green multimodal transportation path optimization based on distributionally robust chance constraints with uncertain demand** [13421-265]
- 13421 62 **Restoring subway station emergency evacuation with improved social force model from the perspective of small groups** [13421-220]
- 13421 63 **Key flight segment identification based on flight segment correlation** [13421-9]
- 13421 64 **Route network rerouting planning based on elastic routing layer** [13421-42]
- 13421 65 **Research on safety early warning technology of liquefied gas carrier passing hub based on Beidou positioning** [13421-40]
- 13421 66 **Optimization of container scheduling considering the use of foldable container** [13421-227]
- 13421 67 **Research on facility station planning methods based on the concept of networks integration** [13421-69]
- 13421 68 **Improved ant colony algorithm-based research on UAV trajectory planning** [13421-267]
- 13421 69 **Identifying intracity trip ends of hazardous goods trucks from GPS trajectories** [13421-271]