Contents

Part I Pedestrian Traffic and Evacuation Dynamics

Modeling of Pedestrians ................................................................. 3
Cecile Appert-Rolland

Generic Instability at the Crossing of Pedestrian Flows ................. 13
Julien Cividini

Crowd Flow Modeling of Athletes in Mass Sports Events:
A Macroscopic Approach ............................................................... 21
Martin Treiber

Pedestrian Evacuation Optimization Dynamic Programming
in Continuous Space and Time ......................................................... 31
Serge P. Hoogendoorn, Winnie Daamen, Dorine C. Duives,
and Femke L.M. van Wageningen-Kessels

Generalized Macroscopic Fundamental Diagram for
Pedestrian Flows ............................................................................. 41
Winnie Daamen, Victor L. Knoop, and Serge P. Hoogendoorn

Pedestrian Route Choice by Iterated Equilibrium Search ............... 47
Tobias Kretz, Karsten Lehmann, and Ingmar Hofsaß

How Navigation According to a Distance Function Improves
Pedestrian Motion in ODE-Based Models ........................................ 55
Felix Dietrich and Gerta Köster

Implementation Issues of Force Based Pedestrian Motion Models.... 63
Gerta Köster and Marion Gödel

Using Bluetooth to Estimate the Impact of Congestion on
Pedestrian Route Choice at Train Stations ....................................... 73
Jeroen van den Heuvel, Aral Voskamp, Winnie Daamen,
and Serge P. Hoogendoorn
Empirical Investigation on Pedestrian Crowd Dynamics and Grouping ................................................................. 83
Andrea Gorrini, Stefania Bandini, and Giuseppe Vizzari

Experimental Analysis of Two-Dimensional Pedestrian Flow in Front of the Bottleneck ........................................ 93
Marek Bukáček, Pavel Hrabák, and Milan Krbálek

Simulation of Crowd-Quakes with Heterogeneous Contact Model.............. 103
Jian Ma, Weiguo Song, and Siuming Lo

New Definition and Analysis of Spatial-Headway in Two-Dimensional Pedestrian Flow ........................................... 111
Xu Mai, Weiguo Song, and Jian Ma

On the Validation of a Discrete-Continuous Model with Bottleneck Flow and Computational Artifacts......................... 121
Ekaterina Kirik, Andrey Malyshev, and Egor Popel

Dynamic Data–Driven Simulation of Pedestrian Movement with Automatic Validation .................................................... 129
Jakub Porzycki, Robert Lubaś, Marcin Mycek, and Jarosław Wąs

Crowd Research at School: Crossing Flows ........................................ 137
Johanna Bamberger, Anna-Lena Geßler, Peter Heitzelmann, Sara Korn, Rene Kahlmeyer, Xue Hao Lu, Qi Hao Sang, Zhi Jie Wang, Guan Zong Yuan, Michael Gauß, and Tobias Kretz

Stair Evacuation Simulation Based on Cellular Automata Model Considering Social Forces ............................................. 145
Ning Ding, Tao Chen, Hui Zhang, and Peter B. Luh

Simulation of Building Evacuation Considering Information Flow ........... 155
Yuan Gao, Tao Chen, Peter B. Luh, and Hui Zhang

Effects of an Obstacle Position for Pedestrian Evacuation: SF Model Approach .......................................................... 163
Takashi Matsuoka, Akiyasu Tomoeda, Mayuko Iwamoto, Kohta Suzuno, and Daishin Ueyama

Realistic Stride Length Adaptation in the Optimal Steps Model .............. 171
Isabella von Sivers and Gerta Köster

A Discrete Spheropolygon Model for Calculation of Stress in Crowd Dynamics ........................................................... 179
Fernando Alonso-Marroquín, Jonathan Busch, Álvaro Ramírez-Gómez, and Celia Lozano

Pedestrian Behavior Analysis in Crowds Using Image-Based Methods ... 187
Saira Saleem Pathan and Klaus Richter
Dynamic Structure in Pedestrian Evacuation: Image Processing Approach ............................................................. 195
Kohta Suzuno, Akiyasu Tomoeda, Mayuko Iwamoto, and Daishin Ueyama

Human-Ant Behavior in Evacuation Dynamics ......................................................... 203
Daniel R. Parisi and Roxana Josens

Escape Velocity of the Leader in a Queue of Pedestrians ......................... 213
Akiyasu Tomoeda, Daichi Yanagisawa, and Katsuhiro Nishinari

Experimental Study on the Interaction Mechanism of Cross-Walking Pedestrians ...................................................... 219
Wei Lv, Xiaoge Wei, and Weiguo Song

Inflow Process: A Counterpart of Evacuation ................................................. 227
Takahiro Ezaki, Kazumichi Ohtsuka, Daichi Yanagisawa, and Katsuhiro Nishinari

Mobility Modelling in a Process Constrained Environment:
Modelling the Movements of Nurses in a Neonatal Intensive Care Unit ................................................................. 233
David Greenwood, Shrikant Sharma, and Anders Johansson

From Drivers to Athletes: Modeling and Simulating Cross-Country Skiing Marathons ....................................................... 243
Martin Treiber, Ralph Germ, and Arne Kesting

Quantitative Estimation of Self-Organization in Bi-directional and Crossing Flows During Crowd Movements ......................... 251
Dorine C. Duives, Winnie Daamen, and Serge P. Hoogendoorn

An Expanded Concept of the “Borrowed Time” in Pedestrian Dynamics Simulations ............................................................. 257
Marcin Mycek, Robert Lubaś, Jakub Porzycki, and Jarosław Wąs

Measuring Disaster Preparedness of UK Cities from Open Spatial Databases ................................................................. 265
Bharat Kunwar and Anders Johansson

Heterogeneous Pedestrian Walking Speed in Discrete Simulation Models ................................................................. 273
Stefania Bandini, Luca Crociani, and Giuseppe Vizzari

Stochastic Headway Dependent Velocity Model and Phase Separation in Pedestrian Dynamics ...................................................... 281
Christian Eilhardt and Andreas Schadschneider

Simulation of Merging Pedestrian Streams at T-Junctions:
Comparison of Density Definitions ........................................................... 291
Matthias Craemeyer and Andreas Schadschneider
Exclusive Queueing Process: The Dynamics of Waiting in Line .......... 299
Chikashi Arita and Andreas Schadschneider

Air Traffic, Boarding and Scaling Exponents............................. 305
Reinhard Mahnke, Jevgenijs Kaupužs, and Martins Brics

Part II Highway and Urban Vehicular Traffic

Time Evolution of Road Networks ............................................ 317
Marc Barthelemy

Spatio-Temporal Traffic Pattern Recognition Based on Probe Vehicles ... 339
Hubert Rehborn and Micha Koller

From Random Walker to Vehicular Traffic: Motion on a Circle .......... 347
Hans Weber, Reinhard Mahnke, and Jevgenijs Kaupužs

Different Approaches to the Multilane Traffic Simulation .............. 361
Antonina Chechina, Natalia Churbanova, and Marina Trapeznikova

Empirical and Theoretical Fundamentals for Reliable Control and Optimization of Vehicular Traffic and Transportation Networks .... 369
Boris S. Kerner

Simulation Model for Traffic Using Network Fundamental Diagrams .... 379
Victor L. Knoop and Serge P. Hoogendoorn

A Model of Car-Following Behavior at Sags ................................ 385
Bernat Goñi Ros, Victor L. Knoop, Wouter J. Schakel, Bart van Arem, and Serge P. Hoogendoorn

Multi-anticipative Car-Following Behaviour: Macroscopic Modeling ... 395
G. Costeseque and Jean-Patrick Lebacque

A Simple Statistical Method for Reproducing the Highway Traffic ....... 407
Luis Eduardo Olmos and José Daniel Muñoz

Controlling of Vehicular Traffic Flow at an Intersection Via Two Schemes of Traffic Lights .............................................. 415
Somayyeh Belbasi and M. Ebrahim Fouladvand

Equation-Free Analysis of Macroscopic Behavior in Traffic and Pedestrian Flow ......................................................... 423
Christian Marschler, Jan Sieber, Poul G. Hjorth, and Jens Starke

Dynamical Systems on Honeycombs ........................................ 441
Valery V. Kozlov, Alexander P. Buslaev, Alexander G. Tatashev, and Marina V. Yashina
Local Stability Conditions and Calibrating Procedure for New Car-Following Models Used in Driving Simulators .................................................. 453
Valentina Kurtc and Igor Anufriev

Physically Bounded Solution for a Conserved Higher-Order Traffic Flow Model .................................................................................. 463
Zhi-Yang Lin, Peng Zhang, Li-Yun Dong, S.C. Wong, and Keechoo Choi

A Review of Cellular Automata Model for Heterogeneous Traffic Conditions .................................................................................. 471
Gaurav Pandey, K. Ramachandra Rao, and Dinesh Mohan

A Demonstration Experiment of a Theory of Jam-Absorption Driving ... 479
Yohei Taniguchi, Ryosuke Nishi, Akiyasu Tomoeda, Kenichiro Shimura, Takahiro Ezaki, and Katsuhiro Nishinari

Generic First-Order Car-Following Models with Stop-and-Go Waves and Exclusion ................................................................. 485
Antoine Tordeux, Sylvain Lassarre, Michel Roussignol, and Vincent Aguiléra

Influence of Velocity Variance of a Single Particle on Cellular Automaton Models .................................................................. 495
Daichi Yanagisawa, Takahiro Ezaki, Akiyasu Tomoeda, and Katsuhiro Nishinari

Critical Density of Experimental Traffic Jam ........................................... 505
Shin-ichi Tadaki, Macoto Kikuchi, Minoru Fukui, Akihiro Nakayama, Katsuhiro Nishinari, Akihiro Shibata, Yuki Sugiyama, Taturu Yosida, and Satoshi Yukawa

Weather and Road Geometry Impact on Acceleration Behavior: Experimental Set-Up and Data Collection Using a Driving Simulator ............................................. 513
Lingqiao Qin and Samer H. Hamdar

The Stability Analysis of a Macroscopic Traffic Flow Model with Two-Classes of Drivers ........................................................... 525
Alma R. Méndez and R.M. Velasco

Driver Heterogeneity in Rubbernecking Behaviour at an Incident Site ......................................................................................... 533
Shahreena Rhasbudin Shah, Victor L. Knoop, and Serge P. Hoogendoorn

Why Does Traffic Jam Acts Universally? ............................................. 541
Tsumugi Ishida and Yūki Sugiyama
Stability and Homogenization of the Optimal Velocity Model .......... 549
Antoine Tordeux

Statistical Analysis of High-Flow Traffic States ......................... 557
Florian Knorr, Thomas Zaksek, Johannes Brügmann,
and Michael Schreckenberg

Simulations of Synchronized Flow in TomTom Vehicle Data
in Urban Traffic with the Kerner-Klenov Model in the
Framework of the Three-Phase Traffic Theory ......................... 563
Gerhard Hermanns, Igor N. Kulkov, Peter Hemmerle, Hubert
Rehborn, Micha Koller, Boris S. Kerner, and Michael
Schreckenberg

Relation Between Longitudinal and Lateral Action Points .......... 571
Victor L. Knoop and Serge P. Hoogendoorn

Applications of the Generalized Macroscopic Fundamental Diagram ...... 577
Serge P. Hoogendoorn, Victor L. Knoop, Hans van Lint, and Hai
L. Vu

Network Fundamental Diagrams and Their Dependence on
Network Topology ...................................................................... 585
Victor L. Knoop, David de Jong, and Serge P. Hoogendoorn

A Simple Cellular Automaton Model with Limited Braking Rule .... 591
Thorsten Chmura, Benedikt Herz, Florian Knorr, Thomas Pitz,
and Michael Schreckenberg

Part III Biological Systems and Granular Flow

Diffusive Transport on Directed Random Networks .................. 601
M. Reza Shaebani, Zeinab Sadjadi, and Ludger Santen

Stochastic Modeling of Cargo Transport by Teams of
Molecular Motors ..................................................................... 609
Sarah Klein, Cécile Appert-Rolland, and Ludger Santen

Molecular Motors with a Stepping Cycle: From Theory
to Experiments ....................................................................... 619
Luca Ciandrini

Correlation Functions and Finite–Size Effects in Granular Media ...... 629
Jevgenijs Kaupužs
Traffic and Granular Flow '13
Chraibi, M.; Boltes, M.; Schadschneider, A.; Seyfried, A. (Eds.)
2015, XXIII, 635 p. 303 illus., 225 illus. in color.,
Hardcover
ISBN: 978-3-319-10628-1