PHYSICAL REVIEW E™

For editorial and subscription correspondence,
please see inside front cover
(ISSN: 1539-3755)

PERIODICALS
Postmaster send address changes to:
APS Subscription Services
Suite 1NO1
2 Huntington Quadrangle
Melville, NY 11747-4502

THIRD SERIES, VOLUME 83, NUMBER 5 *CONTENTS* **MAY 2011**

PART 2: NONLINEAR AND PLASMA PHYSICS, FLUID DYNAMICS, AND RELATED TOPICS

RAPID COMMUNICATIONS

Plasma physics

Observation of the stabilizing effect of a laminated ablator on the ablative Rayleigh-Taylor instability *(4 pages)* . . 055401(R)
L. Masse, A. Casner, D. Galmiche, G. Huser, S. Liberatore, and M. Theobald

ARTICLES

Interdisciplinary physics

Quantification of deviations from rationality with heavy tails in human dynamics *(7 pages)* 056101
T. Maillart, D. Sornette, S. Frei, T. Duebendorfer, and A. Saichev

Theory of volumetric capacitance of an electric double-layer supercapacitor *(10 pages)* 056102
Brian Skinner, Tianran Chen, M. S. Loth, and B. I. Shklovskii

Selective advantage of tolerant cultural traits in the Axelrod-Schelling model *(8 pages)* 056103
C. Gracia-Lázaro, L. M. Floría , and Y. Moreno

Unified framework for quasispecies evolution and stochastic quantization *(8 pages)* 056104
Ginestra Bianconi and Christoph Rahmede

Locally optimal heuristic for modularity maximization of networks *(8 pages)* 056105
Sonia Cafieri, Pierre Hansen, and Leo Liberti

Keyword extraction by nonextensivity measure *(6 pages)* 056106
Ali Mehri and Amir H. Darooneh

Cascades on a class of clustered random networks *(9 pages)* 056107
Adam Hackett, Sergey Melnik, and James P. Gleeson

Scaling mobility patterns and collective movements: Deterministic walks in lattices *(6 pages)* 056108
Xiao-Pu Han, Tao Zhou, and Bing-Hong Wang

Social network dynamics of face-to-face interactions *(18 pages)* 056109
Kun Zhao, Juliette Stehlé, Ginestra Bianconi, and Alain Barrat

Opinion dynamics of random-walking agents on a lattice *(8 pages)* 056110
Suhan Ree

Copyright 2011 by American Physical Society

(Continued)

1539-3755(201105)83:5:2;1-R

PHYSICAL REVIEW E **THIRD SERIES, VOLUME 83, NUMBER 5** **MAY 2011**

Dynamics and complexity of the Schelling segregation model *(13 pages)* 056111
Nicolás Goles Domic, Eric Goles, and Sergio Rica

Path integral approach to the pricing of timer options with the Duru-Kleinert time transformation *(12 pages)* 056112
L. Z. J. Liang, D. Lemmens, and J. Tempere

Structural and functional networks in complex systems with delay *(5 pages)* 056113
Víctor M. Eguíluz, Toni Pérez, Javier Borge-Holthoefer, and Alex Arenas

Inference and learning in sparse systems with multiple states *(10 pages)* 056114
A. Braunstein, A. Ramezanpour, R. Zecchina, and P. Zhang

Optimal topology for parallel discrete-event simulations *(5 pages)* 056115
Yup Kim, Jung-Hwa Kim, and Soon-Hyung Yook

Grain reconstruction of porous media: Application to a Bentheim sandstone *(13 pages)* 056116
J.-F. Thovert and P. M. Adler

Continuous-space automaton model for pedestrian dynamics *(7 pages)* 056117
Gabriel Baglietto and Daniel R. Parisi

Radical-ion-pair reactions are the biochemical equivalent of the optical double-slit experiment *(8 pages)* 056118
Iannis K. Kominis

Tolerating the community detection resolution limit with edge weighting *(9 pages)* 056119
Jonathan W. Berry, Bruce Hendrickson, Randall A. LaViolette, and Cynthia A. Phillips

Mechanics of three-dimensional, nonbonded random fiber networks *(9 pages)* 056120
Gopinath Subramanian and Catalin R. Picu

Multiple epidemic waves in delayed susceptible-infected-recovered models on complex networks *(7 pages)* 056121
Shaofen Zou, Jianhong Wu, and Yuming Chen

Direct, physically motivated derivation of the contagion condition for spreading processes on generalized random networks *(4 pages)* 056122
Peter Sheridan Dodds, Kameron Decker Harris, and Joshua L. Payne

Coarse graining for synchronization in directed networks *(8 pages)* 056123
An Zeng and Linyuan Lü

Vertical cultural transmission effects on demic front propagation: Theory and application to the Neolithic transition in Europe *(10 pages)* 056124
Joaquim Fort

Communities and beyond: Mesoscopic analysis of a large social network with complementary methods *(10 pages)* 056125
Gergely Tibély, Lauri Kovanen, Márton Karsai, Kimmo Kaski, János Kertész, and Jari Saramäki

Chaos and pattern formation

Intrinsic stickiness and chaos in open integrable billiards: Tiny border effects *(8 pages)* 056201
M. S. Custódio and M. W. Beims

Quantum entanglement between a nonlinear nanomechanical resonator and a microwave field *(13 pages)* 056202
Charles P. Meaney, Ross H. McKenzie, and G. J. Milburn

(Continued)

PHYSICAL REVIEW E **THIRD SERIES, VOLUME 83, NUMBER 5** **MAY 2011**

Chaotic saddles in a gravitational field: The case of inertial particles in finite domains *(9 pages)* 056203
Gábor Drótos and Tamás Tél

Pattern formation in oscillatory complex networks consisting of excitable nodes *(12 pages)* 056204
Xuhong Liao, Qinzhi Xia, Yu Qian, Lisheng Zhang, Gang Hu, and Yuanyuan Mi

Wave packet dynamics in one-dimensional linear and nonlinear generalized Fibonacci lattices *(7 pages)* 056205
Zhenjun Zhang, Peiqing Tong, Jiangbin Gong, and Baowen Li

Extreme multistability in a chemical model system *(10 pages)* 056206
Calistus N. Ngonghala, Ulrike Feudel, and Kenneth Showalter

Chaotic motion of propagating pulses in the Gray-Scott model *(6 pages)* 056207
Masaaki Yadome, Kei-Ichi Ueda, and Masaharu Nagayama

Robustness of multilayer oscillator networks *(6 pages)* 056208
Kai Morino, Gouhei Tanaka, and Kazuyuki Aihara

Order parameter for bursting polyrhythms in multifunctional central pattern generators *(6 pages)* 056209
Jeremy Wojcik, Robert Clewley, and Andrey Shilnikov

Nonmonotonic short-time decay of the Loschmidt echo in quasi-one-dimensional systems *(11 pages)* 056210
Arseni Goussev

Mismatch and synchronization: Influence of asymmetries in systems of two delay-coupled lasers *(11 pages)* 056211
K. Hicke, O. D'Huys, V. Flunkert, E. Schöll, J. Danckaert, and I. Fischer

Defects in spatiotemporal diagrams and their relations to phase coherence and lack of observability *(12 pages)* . . . 056212
Dalila Amroun-Aliane, Luc Pastur, and Christophe Letellier

Spiral defect drift in the wave fields of multiple excitation patterns *(8 pages)* 056213
Sumana Dutta and Oliver Steinbock

Exploding dissipative solitons: The analog of the Ruelle-Takens route for spatially localized solutions *(6 pages)* 056214
Orazio Descalzi, Carlos Cartes, Jaime Cisternas, and Helmut R. Brand

Stochastic bifurcations in a bistable Duffing–Van der Pol oscillator with colored noise *(7 pages)* 056215
Yong Xu, Rencai Gu, Huiqing Zhang, Wei Xu, and Jinqiao Duan

Fidelity decay in interacting two-level boson systems: Freezing and revivals *(6 pages)* 056216
Luis Benet, Saúl Hernández-Quiroz, and Thomas H. Seligman

Fractal scattering in a radiation field *(5 pages)* 056217
Yi-Der Lin, Alex Barr, Kyungsun Na, and Linda E. Reichl

Fluid dynamics

Separation of deformable particles in deterministic lateral displacement devices *(7 pages)* 056301
Raymond Quek, Duc Vinh Le, and K.-H. Chiam

(Continued)

PHYSICAL REVIEW E **THIRD SERIES, VOLUME 83, NUMBER 5** **MAY 2011**

Simulation of an ac electro-osmotic pump with step microelectrodes *(7 pages)* 056302
Byoung Jae Kim, Seung-Hyun Lee, Soghra Rezazadeh, and Hyung Jin Sung

Elastic vibrations of a fiber due to impact of an aerosol particle and their influence on the efficiency of fibrous filters *(19 pages)* 056303
A. L. Chernyakov, A. A. Kirsch, and V. A. Kirsch

100-watt sonoluminescence generated by 2.5-atmosphere-pressure pulses *(4 pages)* 056304
Brian Kappus, Shahzad Khalid, and Seth Putterman

Unexpected water flow through Nafion-tube punctures *(5 pages)* 056305
Colin O'Rourke, Ivan Klyuzhin, Ji Sun Park, and Gerald H. Pollack

Scalar decay in a three-dimensional chaotic flow *(11 pages)* 056306
K. Ngan and J. Vanneste

Hydronium-dominated ion transport in carbon-dioxide-saturated electrolytes at low salt concentrations in nanochannels *(10 pages)* 056307
Kristian Lund Jensen, Jesper Toft Kristensen, Andrew Michael Crumrine, Mathias Bækbo Andersen, Henrik Bruus, and Sumita Pennathur

Meniscus of a ferrofluid around a vertical cylindrical wire carrying electric current *(5 pages)* 056308
Thomas John, Kathrin May, and Ralf Stannarius

Transport coefficients for the shear dynamo problem at small Reynolds numbers *(10 pages)* 056309
Nishant K. Singh and S. Sridhar

Capillary climb dynamics in the limits of prevailing capillary and gravity force *(8 pages)* 056310
B. Bijeljic, B. Markicevic, and H. K. Navaz

Evolution of the initial hole in vertically vibrated shear thickening fluids *(9 pages)* 056311
Yulei Xu, Xinglong Gong, Yingqiang Sun, Shouhu Xuan, Wanquan Jiang, and Zhong Zhang

Experimental demonstration of the supersonic-subsonic bifurcation in the circular jump: A hydrodynamic white hole *(5 pages)* 056312
G. Jannes, R. Piquet, P. Maïssa, C. Mathis, and G. Rousseaux

Hydrogen-oxygen flame acceleration and transition to detonation in channels with no-slip walls for a detailed chemical reaction model *(16 pages)* 056313
M. F. Ivanov, A. D. Kiverin, and M. A. Liberman

Anomalous scaling and solitary waves in systems with nonlinear diffusion *(5 pages)* 056314
Alex Hansen, Bo-Sture Skagerstam, and Glenn Tørå

Self-propulsion of a planar electric or magnetic microbot immersed in a polar viscous fluid *(7 pages)* 056315
B. U. Felderhof

Lagrangian velocity autocorrelations in statistically steady rotating turbulence *(6 pages)* 056316
Lorenzo Del Castello and Herman J. H. Clercx

Presence of a Richardson's regime in kinematic simulations *(10 pages)* 056317
F. C. G. A. Nicolleau and A. F. Nowakowski

(Continued)

PHYSICAL REVIEW E **THIRD SERIES, VOLUME 83, NUMBER 5** **MAY 2011**

Effects of polymer additives on Rayleigh-Taylor turbulence *(8 pages)* 056318
G. Boffetta, A. Mazzino, and S. Musacchio

Symmetrization of a polygonal hollow-core vortex through beat-wave resonance *(5 pages)* 056319
Hamid Ait Abderrahmane, Kamran Siddiqui, Georgios H. Vatistas, Mohamed Fayed, and Hoi Dick Ng

Analytical linear theory for the interaction of a planar shock wave with a two- or three-dimensional random isotropic density field *(31 pages)* 056320
C. Huete Ruiz de Lira, A. L. Velikovich, and J. G. Wouchuk

Asymmetrical reverse vortex flow due to induced-charge electro-osmosis around carbon stacking structures *(14 pages)* 056321
Hideyuki Sugioka

Development of a swirling double counterflow *(12 pages)* 056322
Vladimir N. Shtern, María M. Torregrosa, and Miguel A. Herrada

Visual analysis of immiscible displacement processes in porous media under ultrasound effect *(14 pages)* 056323
Khosrow Naderi and Tayfun Babadagli

Nanoscale spiral flow in a cylindrical channel *(4 pages)* 056324
Chanil Jeon, Hawoong Jeong, and Youngkyun Jung

Perturbed breakup of gas bubbles in water: Memory, gas flow, and coalescence *(13 pages)* 056325
Nathan C. Keim

Analysis of traveling-wave electro-osmotic pumping with double-sided electrode arrays *(9 pages)* 056326
Hung-Chun Yeh, Ruey-Jen Yang, and Win-Jet Luo

Coiling of yield stress fluids *(4 pages)* 056327
Yasser Rahmani, Mehdi Habibi, Arman Javadi, and Daniel Bonn

Gas flow near a smooth plate *(5 pages)* 056328
Adam P. Bowles and William A. Ducker

Plasma physics

Collective excitations of a spherically confined Yukawa plasma *(10 pages)* 056401
H. Kählert and M. Bonitz

Stability of nonlinear Vlasov-Poisson equilibria through spectral deformation and Fourier-Hermite expansion *(13 pages)* 056402
Evangelos Siminos, Didier Bénisti, and Laurent Gremillet

Simulation of terahertz generation in corrugated plasma waveguides *(17 pages)* 056403
Andrew J. Pearson, John Palastro, and Thomas M. Antonsen

Classical relativistic model for spin dependence in a magnetized electron gas *(7 pages)* 056404
D. B. Melrose and A. Mushtaq

Stochastic flux freezing and magnetic dynamo *(25 pages)* 056405
Gregory L. Eyink

(Continued)

PHYSICAL REVIEW E **THIRD SERIES, VOLUME 83, NUMBER 5** **MAY 2011**

Turbulence and bias-induced flows in simple magnetized toroidal plasmas *(6 pages)* 056406
B. Li, B. N. Rogers, P. Ricci, K. W. Gentle, and A. Bhattacharjee

Wave dispersion in a counterstreaming, relativistic thermal, magnetized, electron-positron plasma *(8 pages)* 056407
M. W. Verdon and D. B. Melrose

Classical physics

Solitonic propagation and interaction for a generalized variable-coefficient forced Korteweg–de Vries equation in fluids *(6 pages)* 056601
Xin Yu, Yi-Tian Gao, Zhi-Yuan Sun, and Ying Liu

Approach to first-order exact solutions of the Ablowitz-Ladik equation *(6 pages)* 056602
Adrian Ankiewicz, Nail Akhmediev, and Falk Lederer

Approximate action-angle variables for the figure-eight and periodic three-body orbits *(10 pages)* 056603
Milovan Šuvakov and V. Dmitrašinović

Frequency dependence of the subharmonic Shapiro steps *(6 pages)* 056604
Jasmina Tekić and Zoran Ivić

Asymmetric energy flux in a transmission line based on frequency multiplication *(6 pages)* 056605
Feng Tao, Weizhong Chen, Wen Xu, Junting Pan, and Sidan Du

Quantized representation of some nonlinear integrable evolution equations on the soliton sector *(6 pages)* 056606
Yair Zarmi

Externally driven transmission and collisions of domain walls in ferromagnetic wires *(9 pages)* 056607
Andrzej Janutka

Externally driven collisions of domain walls in bistable systems near criticality *(6 pages)* 056608
Andrzej Janutka

Time-periodic solitons in a damped-driven nonlinear Schrödinger equation *(11 pages)* 056609
I. V. Barashenkov, E. V. Zemlyanaya, and T. C. van Heerden

Soliton complexity in the damped-driven nonlinear Schrödinger equation: Stationary to periodic to quasiperiodic complexes *(8 pages)* 056610
I. V. Barashenkov and E. V. Zemlyanaya

Localization-delocalization transition and subdiffusion of discrete nonlinear Schrödinger equation in three dimensions *(6 pages)* 056611
Takamichi Terao

Computational physics

Monte Carlo algorithm for simulating reversible aggregation of multisite particles *(7 pages)* 056701
Qiang Chang(常强) and Jin Yang(杨劲)

Robust numerical method for integration of point-vortex trajectories in two dimensions *(13 pages)* 056702
Spencer A. Smith and Bruce M. Boghosian

Plaquette renormalization scheme for tensor network states *(6 pages)* 056703
Ling Wang, Ying-Jer Kao, and Anders W. Sandvik

(Continued)

PHYSICAL REVIEW E **THIRD SERIES, VOLUME 83, NUMBER 5** **MAY 2011**

Lattice Boltzmann study on Kelvin-Helmholtz instability: Roles of velocity and density gradients *(10 pages)* 056704
Yanbiao Gan, Aiguo Xu, Guangcai Zhang, and Yingjun Li

Speeding up simulation of diffusion in zeolites by a parallel synchronous kinetic Monte Carlo algorithm *(8 pages)* 056705
Andrea Gabrieli, Pierfranco Demontis, Federico G. Pazzona, and Giuseppe B. Suffritti

Kapitza resistance in the lattice Boltzmann-Peierls-Callaway equation for multiphase phonon gases *(11 pages)* . . . 056706
Jonghoon Lee, Ajit K. Roy, and Barry L. Farmer

Shower approach in the simulation of ion scattering from solids *(14 pages)* 056707
V. A. Khodyrev, R. Andrzejewski, A. Rivera, D. O. Boerma, and J. E. Prieto

Using normal modes to calculate and optimize thermal conductivity in functionalized macromolecules *(8 pages)* 056708
Abdellah Ait Moussa and Kieran Mullen

Three-layer dielectric models for generalized Coulomb potential calculation in ellipsoidal geometry *(13 pages)* 056709
Changfeng Xue and Shaozhong Deng

Numerics of the lattice Boltzmann method: Effects of collision models on the lattice Boltzmann simulations *(24 pages)* 056710
Li-Shi Luo (罗礼诗), Wei Liao (廖伟), Xingwang Chen (陈兴旺), Yan Peng (彭艳), and Wei Zhang (张炜)

BRIEF REPORTS

Interdisciplinary physics

Cooperation in scale-free networks with limited associative capacities *(4 pages)* 057101
Julia Poncela, Jesús Gómez-Gardeñes, and Yamir Moreno

Diversity and critical behavior in prisoner's dilemma game *(4 pages)* 057102
C. K. Yun, N. Masuda, and B. Kahng

Chaos and pattern formation

Synchronization patterns in transient spiral wave dynamics *(4 pages)* 057201
Ulrich Parlitz, Alexander Schlemmer, and Stefan Luther

Plasma physics

Electromagnetic surface modes in a magnetized quantum electron-hole plasma *(4 pages)* 057401
A. P. Misra

Computational physics

Closure schemes in stochastic nonlinear dynamics: A validation case study *(4 pages)* 057701
Roman V. Bobryk

(Continued)

PHYSICAL REVIEW E THIRD SERIES, VOLUME 83, NUMBER 5 MAY 2011

ERRATA

Publisher's Note: Thermal lattice Boltzmann method based on a theoretically simple derivation of the Taylor expansion [Phys. Rev. E **83**, 046710 (2011)] *(1 page)* . . . . . 059901(E)
Jae Wan Shim and Renée Gatignol

Publisher's Note: Blue-shifted random-laser-mode selection in gain-assisted anisotropic complex fluids [Phys. Rev. E **83**, 041711 (2011)] *(1 page)* . . . . . 059902(E)
Alessandro Veltri, Melissa Infusino, Sameh Ferjani, Antonio De Luca, and Giuseppe Strangi

Publisher's Note: Neural dynamics in Parkinsonian brain: The boundary between synchronized and nonsynchronized dynamics [Phys. Rev. E **83**, 042901 (2011)] *(1 page)* . . . . . 059903(E)
Choongseok Park, Robert M. Worth, and Leonid L. Rubchinsky

Erratum: Mean square displacement analysis of single-particle trajectories with localization error: Brownian motion in an isotropic medium [Phys. Rev. E **82**, 041914 (2010)] *(3 pages)* . . . . . 059904(E)
Xavier Michalet

Erratum: Fully relativistic form factor for Thomson scattering [Phys. Rev. E **81**, 036411 (2010)] *(2 pages)* . . . . . 059905(E)
J. P. Palastro, J. S. Ross, B. Pollock, L. Divol, D. H. Froula, and S. H. Glenzer

Editorial Note: Constrained maximal power in small engines [Phys. Rev. E **82**, 051109 (2010)] *(1 page)* . . . . . 059906(E)
B. Gaveau, M. Moreau, and L. S. Schulman

Erratum: Devaney's chaos on recurrence plots [Phys. Rev. E **82**, 036209 (2010)] *(1 page)* . . . . . 059907(E)
Yoshito Hirata and Kazuyuki Aihara

Publisher's Note: Experimental evidence of the role of compound counting processes in random walk approaches to fractional dynamics [Phys. Rev. E **83**, 051102 (2011)] *(1 page)* . . . . . 059908(E)
Justyna Trzmiel, Karina Weron, Aleksander Stanislavsky, and Agnieszka Jurlewicz

Publisher's Note: Effective free energy for pinned membranes [Phys. Rev. E **83**, 050901(R) (2011)] *(1 page)* . . . . 059909(E)
Thomas Speck