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 73, NUMBER 3 *CONTENTS* **MARCH 2006**

PART 1: SOFT MATTER AND BIOLOGICAL PHYSICS

RAPID COMMUNICATIONS

Liquid crystals

Dynamics, dynamic soft elasticity, and rheology of smectic-*C* elastomers *(4 pages)* . . . . . 030701(R)
Olaf Stenull and T. C. Lubensky

Surfactant-induced nematic wetting layer at a thermotropic liquid crystal/water interface *(4 pages)* . . . . . 030702(R)
Ch. Bahr

Critical behavior at the isotropic-to-nematic phase transition in a bent-core liquid crystal *(4 pages)* . . . . . 030703(R)
D. Wiant, S. Stojadinovic, K. Neupane, S. Sharma, K. Fodor-Csorba, A. Jákli, J. T. Gleeson, and S. Sprunt

Biological physics

Reversal of bacterial locomotion at an obstacle *(4 pages)* . . . . . 030901(R)
Luis Cisneros, Christopher Dombrowski, Raymond E. Goldstein, and John O. Kessler

Intermediate phase in DNA melting *(4 pages)* . . . . . 030902(R)
Richard A. Neher and Ulrich Gerland

ARTICLES

Statistical physics of soft matter

Universality in two-dimensional cellular structures evolving by cell division and disappearance *(18 pages)* . . . 031101
MirFaez Miri and Nicolas Rivier

Reaction-subdiffusion equations *(4 pages)* 031102
I. M. Sokolov, M. G. W. Schmidt, and F. Sagués

Time-dependent diffusion in a random correlated potential *(4 pages)* 031103
Yan Zhou and Jing-Dong Bao

Kardar-Parisi-Zhang equation in the weak noise limit: Pattern formation and upper critical dimension *(26 pages)* 031104
Hans C. Fogedby

Quantum diffusion in biased washboard potentials: Strong friction limit *(7 pages)* 031105
L. Machura, M. Kostur, P. Talkner, J. Łuczka, and P. Hänggi

Copyright 2006 by The American Physical Society

1539-3755(200603)73:3:1;1-P

(Continued)

PHYSICAL REVIEW E THIRD SERIES, VOLUME 73, NUMBER 3 MARCH 2006

Exactly solvable disordered sphere-packing model in arbitrary-dimensional Euclidean spaces *(8 pages)* 031106
S. Torquato and F. H. Stillinger

Potential energy landscape and finite-state models of array-enhanced stochastic resonance *(8 pages)* 031107
John F. Lindner, Matthew Bennett, and Kurt Wiesenfeld

First passage time densities in resonate-and-fire models *(11 pages)* 031108
T. Verechtchaguina, I. M. Sokolov, and L. Schimansky-Geier

Alignment of rods and partition of integers *(6 pages)* 031109
E. Ben-Naim and P. L. Krapivsky

Fundamental-measure density functional theory study of the crystal-melt interface of the hard sphere system *(6 pages)* 031110
Vadim B. Warshavsky and Xueyu Song

Dynamic properties in a family of competitive growing models *(8 pages)* 031111
Claudio M. Horowitz and Ezequiel V. Albano

Single file diffusion in macroscopic Wigner rings *(7 pages)* 031112
Gwennou Coupier, Michel Saint Jean, and Claudine Guthmann

Superdiffusion in a honeycomb billiard *(9 pages)* 031113
Michael Schmiedeberg and Holger Stark

Entropy of seismic electric signals: Analysis in natural time under time reversal *(8 pages)* 031114
P. A. Varotsos, N. V. Sarlis, E. S. Skordas, H. K. Tanaka, and M. S. Lazaridou

Persistent random walk on a site-disordered one-dimensional lattice: Photon subdiffusion *(8 pages)* 031115
MirFaez Miri, Zeinab Sadjadi, and M. Ebrahim Fouladvand

Equilibrium and linear transport properties of fluids

Macro- and microdefinitions of fragility of hydrogen-bonded glass-forming liquids *(7 pages)* 031201
I. V. Blazhnov, S. Magazù, G. Maisano, N. P. Malomuzh, and F. Migliardo

Calculations of accommodation coefficients for diatomic molecular gases *(11 pages)* 031202
Hailemariam Ambaye and J. R. Manson

Granular materials

Hydrodynamic profiles for an impurity in an open vibrated granular gas *(12 pages)* 031301
J. Javier Brey, M. J. Ruiz-Montero, and F. Moreno

Continuum approach to wide shear zones in quasistatic granular matter *(10 pages)* 031302
Martin Depken, Wim van Saarloos, and Martin van Hecke

Abrupt transition in a sandpile model *(5 pages)* 031303
Y. F. Contoyiannis and F. K. Diakonos

Surface roughness effects in granular matter: Influence on angle of repose and the absence of segregation *(9 pages)* 031304
Nicholas A. Pohlman, Benjamin L. Severson, Julio M. Ottino, and Richard M. Lueptow

Segregation of large granules from close-packed cluster of small granules due to buoyancy *(7 pages)* 031305
Xian-qing Yang, Kun Zhou, Kang Qiu, and Yue-min Zhao

Jamming of three-dimensional prolate granular materials *(5 pages)* 031306
K. Desmond and Scott V. Franklin

(Continued)

PHYSICAL REVIEW E THIRD SERIES, VOLUME 73, NUMBER 3 MARCH 2006

Use of a void network model to correlate porosity, mercury porosimetry, thin section, absolute permeability, and NMR relaxation time data for sandstone rocks *(9 pages)* 031307
G. Peter Matthews, Christophe F. Canonville, and Adam K. Moss

Colloidal dispersions, suspensions, and aggregates

Impact of boundaries on velocity profiles in bubble rafts *(7 pages)* 031401
Yuhong Wang, Kapilanjan Krishan, and Michael Dennin

Computer simulation of electrical conductivity of colloidal dispersions during aggregation *(6 pages)* 031402
N. I. Lebovka, S. Tarafdar, and N. V. Vygornitskii

Double-peaked impact force of very soft gel balls *(6 pages)* 031403
Yoshimi Tanaka

Simple models of complex aggregation: Vesicle formation by soft repulsive spheres with dipolelike interactions *(9 pages)* 031404
P. Ballone and M. G. Del Pópolo

Duality and similarity properties of the effective permittivity of two-dimensional heterogeneous medium with inclusion of fractal geometry *(8 pages)* 031405
Abdelilah Mejdoubi and Christian Brosseau

Ellipsometric light scattering for the characterization of thin layers on dispersed colloidal particles *(6 pages)* 031406
Andreas Erbe, Klaus Tauer, and Reinhard Sigel

Scattering for mixtures of hard spheres: Comparison of total scattering intensities with model *(13 pages)* 031407
B. J. Anderson, V. Gopalakrishnan, S. Ramakrishnan, and C. F. Zukoski

Dynamic effects on nonlinear alternating current responses in electrorheological fluids *(12 pages)* 031408
W. J. Tian, J. P. Huang, and K. W. Yu

Structured and complex fluids

Low-frequency dynamical heterogeneity in simulated amorphous $Ni_{0.5}Zr_{0.5}$ below its glass temperature: Correlations with cage volume and local order fluctuations *(11 pages)* 031501
I. Ladadwa and H. Teichler

Symmetry, equivalence, and molecular self-assembly *(17 pages)* 031502
Kevin Van Workum and Jack F. Douglas

Stress response and structural transitions in sheared gyroidal and lamellar amphiphilic mesophases: Lattice-Boltzmann simulations *(12 pages)* 031503
Nélido González-Segredo, Jens Harting, Giovanni Giupponi, and Peter V. Coveney

Simulated structural and thermal properties of glassy and liquid germania *(11 pages)* 031504
M. Micoulaut, Y. Guissani, and B. Guillot

Modeling of droplet breakup in a microfluidic T-shaped junction with a phase-field model *(9 pages)* 031505
Mario De Menech

Films, interfaces, and crystal growth

Step dynamics on vicinal surfaces using discrete interface models *(4 pages)* 031601
P. J. Upton

(Continued)

PHYSICAL REVIEW E THIRD SERIES, VOLUME 73, NUMBER 3 MARCH 2006

Roughening and inclination of competition interfaces *(4 pages)* 031602
Pablo A. Ferrari, James B. Martin, and Leandro P. R. Pimentel

Tessellation of a stripe *(10 pages)* 031603
Piotr Garstecki and George M. Whitesides

Spinodal decomposition in thin films: Molecular-dynamics simulations of a binary Lennard-Jones fluid mixture *(15 pages)* 031604
Subir K. Das, Sanjay Puri, Jürgen Horbach, and Kurt Binder

Transport theory at the nanoscale. I. Surface waves *(4 pages)* 031605
A. ten Bosch

Transport theory at the nanoscale. II. Interface dynamics for film growth *(5 pages)* 031606
A. ten Bosch

Statistical mechanics of nucleation: Incorporating translational and rotational free energy into thermodynamics of a microdroplet *(10 pages)* 031607
Isamu Kusaka

Breath figure templated self-assembly of porous diblock copolymer films *(7 pages)* 031608
Aaron E. Saunders, Jasper L. Dickson, Parag S. Shah, Min Young Lee, Kwon Taek Lim, Keith P. Johnston, and Brian A. Korgel

Diffusive atomistic dynamics of edge dislocations in two dimensions *(12 pages)* 031609
J. Berry, M. Grant, and K. R. Elder

Liquid crystals

Evolution of light-induced anchoring in dye-doped nematics: Experiment and model *(8 pages)* 031701
Denis Fedorenko, Elena Ouskova, Victor Reshetnyak, and Yuriy Reznikov

Casimir interaction in smectic-A liquid crystals caused by coupled fluctuations of positional and orientational order *(8 pages)* 031702
B. Markun and S. Žumer

Physical mechanism for in-plane molecular orientation in polymer-dispersed ferroelectric liquid crystals *(7 pages)* 031703
Min Young Jin, You-Jin Lee, Kyehun Lee, Sin-Doo Lee, and Jae-Hoon Kim

Polar order in columnar phase made of polycatenar bent-core molecules *(5 pages)* 031704
Ewa Gorecka, Damian Pociecha, Joanna Matraszek, Jozef Mieczkowski, Yoshio Shimbo, Yoichi Takanishi, and Hideo Takezoe

Complete breakdown of the Debye model of rotational relaxation near the isotropic-nematic phase boundary: Effects of intermolecular correlations in orientational dynamics *(8 pages)* 031705
Prasanth P. Jose, Dwaipayan Chakrabarti, and Biman Bagchi

Spontaneous shears in smectic elastomers *(8 pages)* 031706
J. M. Adams and M. Warner

Soft-stiff regime crossover for an aerosil network dispersed in liquid crystals *(4 pages)* 031707
George Cordoyiannis, Samo Kralj, George Nounesis, Slobodan Žumer, and Zdravko Kutnjak

Hydrodynamics of polar liquid crystals *(8 pages)* 031708
William Kung, M. Cristina Marchetti, and Karl Saunders

(Continued)

PHYSICAL REVIEW E THIRD SERIES, VOLUME 73, NUMBER 3 MARCH 2006

Polymers

Surface segregation of conformationally asymmetric polymer blends *(11 pages)* 031801
Semjon Stepanow and Andrei A. Fedorenko

Viscoelasticity of aqueous telechelic poly(ethylene oxide) solutions: Relaxation and structure *(8 pages)* 031802
L. A. Hough and H. D. Ou-Yang

Free volume of an epoxy resin and its relation to structural relaxation: Evidence from positron lifetime and pressure-volume-temperature experiments *(14 pages)* 031803
Günter Dlubek, E. M. Hassan, Reinhard Krause-Rehberg, and Jürgen Pionteck

Random isotropic structures and possible glass transitions in diblock copolymer melts *(16 pages)* 031804
Cheng-Zhong Zhang and Zhen-Gang Wang

Biological physics

Microrheological characterization of anisotropic materials *(5 pages)* 031901
I. A. Hasnain and A. M. Donald

Topology of pseudoknotted homopolymers *(4 pages)* 031902
Graziano Vernizzi, Paolo Ribeca, Henri Orland, and A. Zee

Dynamic functional tuning of nonlinear cortical networks *(8 pages)* 031903
Martin Stetter

Structure of DNA-CTAB-hexanol complexes *(8 pages)* 031904
Rema Krishnaswamy, Georg Pabst, Michael Rappolt, V. A. Raghunathan, and A. K. Sood

Health status and resonance in a model for living organisms under periodic stress and healing *(8 pages)* 031905
B.-G. Yoon, J. Choi, M. Y. Choi, and J.-Y. Fortin

Generalized theory of semiflexible polymers *(13 pages)* 031906
Paul A. Wiggins and Philip C. Nelson

Instability of synchronized motion in nonlocally coupled neural oscillators *(7 pages)* 031907
Hidetsugu Sakaguchi

Role of inhibitory feedback for information processing in thalamocortical circuits *(15 pages)* 031908
Jörg Mayer, Heinz Georg Schuster, and Jens Christian Claussen

Connectivity and expression in protein networks: Proteins in a complex are uniformly expressed *(6 pages)* 031909
Shai Carmi, Erez Y. Levanon, Shlomo Havlin, and Eli Eisenberg

Correlated transition between two activity states of neurons *(6 pages)* 031910
Go Uchida, Mitsuhiro Fukuda, and Manabu Tanifuji

Condensation of DNA-actin polyelectrolyte mixtures driven by ions of different valences *(10 pages)* 031911
Olena V. Zribi, Hee Kyung, Ramin Golestanian, Tanniemola B. Liverpool, and Gerard C. L. Wong

Network growth models and genetic regulatory networks *(8 pages)* 031912
D. V. Foster, S. A. Kauffman, and J. E. S. Socolar

Periodic and aperiodic traveling pulses in population dynamics: An example from the occurrence of epidemic infections *(6 pages)* 031913
A. Vecchio, L. Primavera, and V. Carbone

(Continued)

PHYSICAL REVIEW E THIRD SERIES, VOLUME 73, NUMBER 3 MARCH 2006

Noise-driven switching between limit cycles and adaptability in a small-dimensional excitable network with balanced coupling *(11 pages)* 031914
Leonid A. Safonov and Yoshiharu Yamamoto

Cross-correlation of instantaneous phase increments in pressure-flow fluctuations: Applications to cerebral autoregulation *(14 pages)* 031915
Zhi Chen, Kun Hu, H. Eugene Stanley, Vera Novak, and Plamen Ch. Ivanov

Full q-space analysis of x-ray scattering of multilamellar membranes at liquid-solid interfaces *(8 pages)* 031916
Da-Peng Li, Shu-Xin Hu, and Ming Li

Pattern formation in a gene network model with boundary shape dependence *(12 pages)* 031917
Luis Diambra and Luciano da Fontoura Costa

Budded membrane microdomains as tension regulators *(4 pages)* 031918
Pierre Sens and Matthew S. Turner

Modeling DNA loops using the theory of elasticity *(23 pages)* 031919
Alexander Balaeff, L. Mahadevan, and Klaus Schulten

Clustering of protein structures using hydrophobic free energy and solvent accessibility of proteins *(14 pages)* 031920
Z. G. Yu, V. V. Anh, K. S. Lau, and L. Q. Zhou

Geometry of proteins: Hydrogen bonding, sterics, and marginally compact tubes *(5 pages)* 031921
Jayanth R. Banavar, Marek Cieplak, Alessandro Flammini, Trinh X. Hoang, Randall D. Kamien, Timothy Lezon, Davide Marenduzzo, Amos Maritan, Flavio Seno, Yehuda Snir, and Antonio Trovato

Dynamic transitions in coupled motor proteins *(5 pages)* 031922
Evgeny B. Stukalin and Anatoly B. Kolomeisky

Opening of a weak link in a semiflexible ring polymer *(15 pages)* 031923
K. P. Santo and K. L. Sebastian

Application of random matrix theory to microarray data for discovering functional gene modules *(5 pages)* 031924
Feng Luo, Jianxin Zhong, Yunfeng Yang, and Jizhong Zhou

Single molecule study of DNA conductivity in aqueous environment *(6 pages)* 031925
O. Legrand, D. Côte, and U. Bockelmann

BRIEF REPORTS

Statistical physics of soft matter

Non-Markovian Fokker-Planck equation: Solutions and first passage time distribution *(4 pages)* 032101
P. C. Assis, Jr., R. P. de Souza, P. C. da Silva, L. R. da Silva, L. S. Lucena, and E. K. Lenzi

Molecular dynamics simulations of ballistic annihilation *(4 pages)* 032102
Adam Lipowski, Dorota Lipowska, and António L. Ferreira

Equilibrium and linear transport properties of fluids

Structural corrections to Stokes-Einstein relation for liquid metals near freezing *(3 pages)* 032201
N. H. March and J. A. Alonso

de Gennes slowing in a liquid metal revisited: A neutron spin-echo study *(3 pages)* 032202
F. Demmel, P. Fouquet, W. Häussler, and C. Morkel

(Continued)

PHYSICAL REVIEW E THIRD SERIES, VOLUME 73, NUMBER 3 MARCH 2006

Films, interfaces, and crystal growth

Dynamics of capillary condensation in aerogels *(4 pages)* 032601
R. Nomura, W. Miyashita, K. Yoneyama, and Y. Okuda

Liquid crystals

Phase transitions of semiflexible hard-sphere chain liquids *(4 pages)* 032701
Hanif Bayat Movahed, Raul Cruz Hidalgo, and D. E. Sullivan

(Continued)