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Editorial

Propagation Phenomena and Transitions in Complex Systems 2014

Ezzat G. Bakhoum,[1] Haipeng Peng,[2] and Florin Pop[3]

[1] *University of West Florida, 11000 University Parkway, Pensacola, FL 32514, USA*
[2] *Beijing University of Posts and Telecommunications, Beijing, China*
[3] *Politehnica University, Bucharest, Romania*

Correspondence should be addressed to Ezzat G. Bakhoum; ebakhoum@uwf.edu

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The challenge in advanced engineering applications based on efficient mathematical models for propagation and transition phenomena can be noticed nowadays in many research fields. Fractal theory and special mathematical functions are used not only for the design of nanostructures but also for studying propagation in complex artificial networks. Differential geometry is adapted for solving nonlinear partial differential equations with great number of variables for modelling propagation and transitions for different type of electromagnetic, acoustic, and optic waves. Commutative and/or additive consequences of quantum physics are used extensively in the design of long range transmission systems. Advanced mathematical tools connected to wavelets are recommended for biological phenomena. All these advanced engineering subjects require efficient mathematical models adapted for nonlinear propagation phenomena and for complex systems, when specific limitations are involved (very long distance propagation, fractal aspects and transitions in nanostructures, complex systems with great number of variables, and infinite spatiotemporal extension of material media). Using advanced mathematical tools for modeling propagation and transition phenomena, this special issue presents high qualitative and innovative developments for efficient mathematical approaches of propagation phenomena and transitions in complex systems. Significant results were obtained for propagation of waves in advanced materials dynamics of complex systems, efficient signal and image analysis based on fundamental mathematical and physical laws, and transitions in complex networks.

This special issue involves 12 original papers selected by the editors so as to present the most significant results in the above mentioned topics. These papers are organized as follows.

Three papers on analytical methods based on swarm intelligence and data mining are as follows: (i) "A New Approach for Flexible Molecular Docking Based on Swarm Intelligence," by Y. Fu et al.; (ii) "A Parallel Community Structure Mining Method in Big Social Networks," by S. Jin et al.; and (iii) "Prevention and Trust Evaluation Scheme Based on Interpersonal Relationships for Large-Scale Peer-to-Peer Networks," by L. Li et al.

Three papers on watermarking, feature embedding, and data integrity checking are as follows: (i) "A Secure and Effective Anonymous Integrity Checking Protocol for Data Storage in Multicloud," by L. Song et al.; (ii) "Cryptanalysis and Improvement of the Robust and Blind Watermarking Scheme for Dual Color Image," by H. Nan et al.; and (iii) "Topological Embedding Feature Based Resource Allocation in Network Virtualization," by H. Cui et al.

Three papers on coherence, mapping, and similarity modeling are as follows: (i) "Obtaining Cross Modal Similarity Metric with Deep Neural Architecture," by R. Li et al.; (ii) "Alternating Coordinate-Momentum Representation for Quantum States Based on Bopp Operators for Modelling Long-Distance Coherence Aspects," by E. G. Bakhoum and C. Toma; and (iii) "Topology Identification of Coupling Map Lattice under Sparsity Condition," by J. Yu et al.

Two papers on aspects of wave propagation are as follows: (i) "On the Propagation of Longitudinal Stress Waves in Solids and Fluids by Unifying the Navier-Lame and Navier-Stokes Equations," by A. Barzkar and H. Adibi, and (ii) "Stochastic Fractional Heat Equations Driven by Fractional Noises," by X. Sun and M. Li.

One paper on error correction schemes is as follows: (i) "An Effective Error Correction Scheme for Arithmetic Coding," by Q. Lin et al.

Ezzat G. Bakhoum
Haipeng Peng
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