Отчет на секция „Паралелни алгоритми“ за 2013 г.

Ръководител: *проф. дн Иван Димов*

1. Публикационна дейност

1.1. Публикации, които са реферирани и индексирани в световната система за реферииране, индексиране и оценяване

1.1.1. Излезли от печат през 2013 г.

1. S. Ahmed, **M. Nedjalkov**, D. Vasileska. Comparative Study of Various Self-Consistent Event Biasing Schemes for Monte Carlo Simulations of Nanoscale MOSFETs. Book Chapter in: "Theory and Applications of Monte Carlo Simulations", V. Chan (ed.). Intech Open Access Publisher, **2013**, 109 – 133. ISBN: 978-953-51-1012-5. Doi: 10.5772/53113 *(глава от книга).*
2. **Aleksandrov L.**, Djidjev H., Maheshwari A., Sack J.-R. An Approximation Algorithm for Computing Shortest Paths in Weighted 3-d Domains. *Discrete and Computational Geometry* 50 (1), **2013**, 124-184. ISSN: 0179-5376. SJR (2012): 1.088. IF (2012): 0.649. 5-year IF: 0.741.
3. S. Amoroso, L. Gerrer, A. Asenov, J. M. Sellier, **I. T. Dimov, M. Nedjalkov**, S. Selberherr. Quantum Insights in Gate Oxide Charge-Trapping Dynamics in Nanoscale MOSFETs. Proceedings of the 18th International Conference on Simulation of Semiconductor Processes and Devices, **2013**, 25 – 28. ISBN: 978-1-4673-5733-3.
4. **A. Andreev,** M. Racheva. Nonconforming Rectangular Morley Finite Elements. – In: I. T. Dimov, I. Faragó, and L. Vulkov (Eds.) Proceedings of NAA 2012, LNCS 8236, Springer, **2013**, 158 - 165. ISSN: 0302-9743. SJR (2012): 0.332.
5. **I. T. Dimov**, K. Atanassov. Interpretation of a Monte Carlo Approach of a Finite Difference Scheme by a Game Method for Modelling.- In: Proc. Jangjeon Math. Soc. 16 (3), **2013**, 381-388, ISSN: 1598-7264. SJR(2011): 0.035.
6. **I. T. Dimov, R. Georgieva**. Multidimensional Sensitivity Analysis of Large-scale Mathematical Models. O.P. Iliev et al. (eds.), Numerical Solution of Partial Differential Equations: Theory, Algorithms, and Their Applications, Springer Proceedings in Mathematics & Statistics 45, Springer Science+Business Media, New York, **2013**, 137 – 156. ISBN: 978-1-4614-7171-4 (Print) 978-1-4614-7172-1 (Online). DOI 10.1007/978-1-4614-7172-1 8 *(глава от книга).*
7. **I. T. Dimov, R. Georgieva, Tz. Ostromsky**, Z. Zlatev. Sensitivity Studies of Pollutant Concentrations Calculated by UNI-DEM with Respect to the Input Emissions. Central European Journal of Mathematics, "Numerical Methods for Large Scale Scientific Computing" 11 (8), **2013**, 1531 – 1545. ISSN:1895-1074. Doi: 10.2478/s11533-013-0256-2. IF (2012): 0.405.
8. **I. T. Dimov, R. Georgieva, Tz. Ostromsky**, Z. Zlatev. Advanced Algorithms for Multidimensional Sensitivity Studies of Large-scale Air Pollution Models based on Sobol Sequences. Special issue of *Computers and Mathematics with Applications* 65 (3), “Efficient Numerical Methods for Scientific Applications”. Elsevier, **2013**, 338 – 351. ISSN: 0898-1221. Doi: 10.1016/j.camwa.2012.07.005. IF (2012): 2.069. 5-year IF: 1.894.

9. **I. T. Dimov, R. Georgieva, Tz. Ostromsky**, Z. Zlatev. Variance-based Sensitivity Analysis of the Unified Danish Eulerian Model According to Variations of Chemical Rates. – In: I. T. Dimov, I. Faragó, and L. Vulkov (Eds.) Proceedings of NAA 2012, LNCS 8236, Springer, **2013**, 247 – 254. ISSN: 0302-9743. SJR (2012): 0.332.
10. **Fidanova S.** Application of HPD Model for Predicting Protein Mutations. *Int. J. Cybernetics and Information Technologies* 13 (4), **2013**, 95 – 103. ISSN: 1311-9702. SJR (2012): 0.101.
11. **S. Fidanova, P. Marinov**. Ant Colony Optimization Start Strategies Performance According Some of the Parameters. – In: I. T. Dimov, I. Faragó, and L. Vulkov (Eds.). Proceedings of NAA 2012, LNCS 8236, Springer, **2013**, 287-294. ISSN: 0302-9743. SJR (2012): 0.332.
12. **Fidanova S.**, Roeva O., Hybrid Bat Algorithm for Parameter Identification of an E. coli Cultivation Process Model. *Biotechnology & Biotechnological Equipment* 27 (6), DIAGNOSIS PRESS LTD, **2013**, 4323-4326. ISSN:1310-2818. SJR (2012): 0.217. IF: 0.760.
13. **Fidanova S.**, Roeva O., Ganzha M., ACO and GA for Parameter Settings of E.coly Fed-Batch Cultivation Model, Recent Advancece in Computational Optimizattion, Studies in Computational Intelligence 470, S. Fidanova (editor), Book chapter 4, Springer, ISBN: 978-3-319-00409-9, **2013**, 51 – 71.
14. **S. Fidanova**, O. Roeva. Metaheuristic Techniques for Optimization of an E. coli Cultivation Model. *Biotechnology & Biotechnological Equipment* 27(3). DIAGNOSIS PRESS LTD, **2013**, 3870 - 3876. ISSN: 1310-2818. IF: 0.760.S.
15. **S. Fidanova**, **M. Shindarov**, **P. Marinov**. Multi-Objective Ant Algorithm for Wireless Sensor Network Positioning. Proceedings of the Bulgarian Academy of Sciences 66(3), **2013**, 353 - 360. ISSN: 1310-1331, IF (2012): 0.211.
16. **Marinov, P.**, Zhang, S., Kutiev, I., Comparison of topside ionosphere scale height modeled by the Topside Sounder Model and incoherent scatter radar ionospheric model, Journal Advances in Space Research, 52(10), **2013**, 1717-1725. ISSN: 0273-1177. IF (2012) = 1.183. 5-year IF: 1.121.

    M. Nedjalkov, P. Schwaha, S. Selberherr, J. M. Sellier, D. Vasileska. Wigner Quasi-Particle Attributes - An Asymptotic Perspective. *Applied Physics Letters* 102, **2013**, art. no. 163113, 163113-1 - 163113-4. ISSN: 0003-6951. IF (2012): 3.794. 5-year IF: 3.817.
17. **Tz. Ostromsky, I. T. Dimov, R. Georgieva, P. Marinov**, Z. Zlatev. High Performance Computing of Data for a New Sensitivity Analysis Algorithm, Applied in an Air Pollution Model. – In: I. T. Dimov, I. Faragó, and L. Vulkov (Eds.) Proceedings of NAA 2012, LNCS 8236, Springer, **2013**, 428 – 436. ISSN: 0302-9743. SJR (2012): 0.332.
18. **Tz. Ostromsky, I. T. Dimov, R. Georgieva, P. Marinov**, Z. Zlatev. Sensitivity Study of a Large-Scale Air Pollution Model by Using High-Performance Computations and Monte Carlo Algorithms. – In: Proceedings of Fifth International Conference AMiTaNS'13, June 24 - 29, 2013, Albena, Bulgaria, AIP Conf. Proceedings 1561, **2013**, 153 – 163. ISSN: 0094-243X; ISBN: 978-0-7354-1189-0. Doi: 10.1063/1.4827224. SJR (2012): 0.161.
19. Roeva O., **Fidanova S.**, Paprzycki M., Influence of the Population Size on the Genetic Algorithm Performance in Case of Cultivation Process Modelling. - In: Proc. of FedCSIS 2013, IEEE Xplorer. ISSN: 2300-5963. ISBN: 978-1-4673-4471-5, IEEE Catalog Number: CFP1385N-ART, **2013**, 371 – 376.

20. P. Schwaha, D. Querlioz, P. Dollfus, J. Saint-Martin, **M. Nedjalkov**, S. Selberherr. Decoherence effects in the Wigner function formalism. *Journal of Computational Electronics* 12 (3), **2013**, 388 - 396. ISSN: 1569-8025. IF (2012): 1.013.
21. P. Schwaha, J. M. Sellier, **M. Nedjalkov**, **I. T. Dimov**, S. Selberherr. The Ultimate Equivalence Between Coherent Quantum and Classical Regimes. Proceedings of the 16th International Workshop on Computational Electronics, **2013**, 152-153. ISBN: 978-3-901578-26-7.
22. J. M. Sellier, **M. Nedjalkov**, **I. T. Dimov**, S. Selberherr. Two-dimensional Transient Wigner Particle Model. Proceedings of the 18th International Conference on Simulation of Semiconductor Processes and Devices, **2013**, 404 – 407. ISBN: 978-1-4673-5733-3.

1.1.2. Приети за печат

1. **A. Andreev,** M. Racheva. Two-sided bounds of eigenvalues of second- and fourth-order elliptic operators, Appl. Math. ISSN: 0862-7940. IF (2012): 0.222, 5-year IF: 0.549.
2. **S. Fidanova, P. Marinov**, M. Paprzycki. Influence of the Number of Ants on Multi-Objective Ant Colony Optimization Algorithm for Wireless Sensor Network Layout. – In: Proceedings of 9th International Conference on "Large-Scale Scientific Computations" LSSC 2013, June 03 - 07, 2013, Sozopol, Bulgaria, Lecture Notes in Computer Science, Springer, Germany. ISSN: 0302-9743. SJR (2012): 0.332.
3. **Fidanova S., Marinov P.**, Paparzycki M. Multi-Objective ACO Algorithm for WSN Layout: Performance According Number of Ants. Int. J. of Metaheuristics. ISSN: 1755-2176.
4. M. Magdics, L. Szirmay-Kalos, B. Tóth, **A. Penzov.** Analysis and Control of the Accuracy and Convergence of the ML-EM Iteration. – In: Proceedings of 9th International Conference on "Large-Scale Scientific Computations" LSSC 2013, June 03 - 07, 2013, Sozopol, Bulgaria, Lecture Notes in Computer Science, Springer, Germany. ISSN: 0302-9743. SJR (2012): 0.332.
5. Roeva O., **Fidanova S.**, Atanassova V., Hybrid ACO-GA for Parameter Identification of an E. coli Cultivation Process Model. – In: Proceedings of 9th International Conference on "Large-Scale Scientific Computations" LSSC 2013, June 03 - 07, 2013, Sozopol, Bulgaria, Lecture Notes in Computer Science, Springer, Germany. ISSN: 0302-9743. SJR (2012): 0.332.
6. P. Schwaha, **M. Nedjalkov**, S. Selberherr, J. M. Sellier, **I. T. Dimov, R. Georgieva**. Stochastic Formulation of Newton's Acceleration. – In: Proceedings of 9th International Conference on "Large-Scale Scientific Computations" LSSC 2013, June 03 - 07, 2013, Sozopol, Bulgaria, Lecture Notes in Computer Science, Springer, Germany. ISSN: 0302-9743. SJR (2012): 0.332.
7. J. M. Sellier, **M. Nedjalkov, I. T. Dimov**, S. Selberherr, The Role of Annihilation in a Wigner Monte Carlo approach. – In: Proceedings of 9th International Conference on "Large-Scale Scientific Computations" LSSC 2013, June 03 - 07, 2013, Sozopol, Bulgaria, Lecture Notes in Computer Science, Springer, Germany. ISSN: 0302-9743. SJR (2012): 0.332.
8. J.M. Sellier, **M. Nedjalkov**, **I. T. Dimov**, S. Selberherr. Decoherence and Time Reversibility:The Role of Randomness at Interfaces, *Journal of Applied Physics***,** 2013. ISSN 0021-8979. IF (2012): 2.21.
9. Sotirova E., Velizarova E., **Fidanova S.**, Atanasov K., Modeling Forest Fire Spread through a Game Method for Modeling Based on Hexagonal Cells. – In: Proceedings of

9th International Conference on “Large-Scale Scientific Computations” LSSC 2013, June 03 - 07, 2013, Sozopol, Bulgaria, Lecture Notes in Computer Science, Springer, Germany. ISSN: 0302-9743. SJR (2012): 0.332.

10. P. Szmeja, K. Wasielewska, M. Ganzha, M. Drozdowicz, M. Paprzycki, **S. Fidanova**, I. Lirkov, Reengineering and Extending the Agents in Grid Ontology. – In: Proceedings of 9th International Conference on “Large-Scale Scientific Computations” LSSC 2013, June 03 - 07, 2013, Sozopol, Bulgaria, Lecture Notes in Computer Science, Springer, Germany. ISSN: 0302-9743. SJR (2012): 0.332.

1.2. *Публикации, които са реферирани и индексирани в световната система за реферране, индексиране и оценяване и са включени в издания с импакт фактор IF (Web Of Science) или импакт ранг SJR (SCOPUS)*

1.2.1. Излезли от печат през 2013 г.

1. **Aleksandrov L.**, Djidjev H., Maheshwari A., Sack J.-R. An Approximation Algorithm for Computing Shortest Paths in Weighted 3-d Domains. *Discrete and Computational Geometry* 50 (1), **2013**, 124-184. ISSN: 0179-5376. SJR (2012): 1.088. IF (2012): 0.649. 5-year IF: 0.741.
2. **A. Andreev,** M. Racheva. Nonconforming Rectangular Morley Finite Elements. – In: I. T. Dimov, I. Faragó, and L. Vulkov (Eds.) Proceedings of NAA 2012, LNCS 8236, Springer, **2013**, 158 - 165. ISSN: 0302-9743. SJR (2012): 0.332.
3. **I. T. Dimov**, K. Atanassov. Interpretation of a Monte Carlo Approach of a Finite Difference Scheme by a Game Method for Modelling.- In: Proc. Jangjeon Math. Soc. 16 (3), **2013**, 381-388, ISSN: 1598-7264. SJR(2011): 0.035.
4. **I. T. Dimov, R. Georgieva, Tz. Ostromsky**, Z. Zlatev. Sensitivity Studies of Pollutant Concentrations Calculated by UNI-DEM with Respect to the Input Emissions. Central European Journal of Mathematics, "Numerical Methods for Large Scale Scientific Computing" 11 (8), **2013**, 1531 – 1545. ISSN:1895-1074. Doi: 10.2478/s11533-013-0256-2. IF (2012): 0.405.
5. **I. T. Dimov, R. Georgieva, Tz. Ostromsky**, Z. Zlatev. Advanced Algorithms for Multidimensional Sensitivity Studies of Large-scale Air Pollution Models based on Sobol Sequences. Special issue of *Computers and Mathematics with Applications* 65 (3), “Efficient Numerical Methods for Scientific Applications”. Elsevier, **2013**, 338 – 351. ISSN: 0898-1221. Doi: 10.1016/j.camwa.2012.07.005. IF (2012): 2.069. 5-year IF: 1.894.
6. **I. T. Dimov, R. Georgieva, Tz. Ostromsky**, Z. Zlatev. Variance-based Sensitivity Analysis of the Unified Danish Eulerian Model According to Variations of Chemical Rates. – In: I. T. Dimov, I. Faragó, and L. Vulkov (Eds.) Proceedings of NAA 2012, LNCS 8236, Springer, **2013**, 247 – 254. ISSN: 0302-9743. SJR (2012): 0.332.
7. **Fidanova S.** Application of HPD Model for Predicting Protein Mutations. *Int. J. Cybernetics and Information Technologies* 13 (4), **2013**, 95 – 103. ISSN: 1311-9702. SJR (2012): 0.101.
8. **S. Fidanova, P. Marinov**. Ant Colony Optimization Start Strategies Performance According Some of the Parameters. – In: I. T. Dimov, I. Faragó, and L. Vulkov (Eds.). Proceedings of NAA 2012, LNCS 8236, Springer, **2013**, 287-294. ISSN: 0302-9743. SJR (2012): 0.332.

9. **Fidanova S.**, Roeva O., Hybrid Bat Algorithm for Parameter Identification of an E. coli Cultivation Process Model. *Biotechnology & Biotechnological Equipment* 27 (6), DIAGNOSIS PRESS LTD, **2013**, 4323-4326. ISSN:1310-2818. SJR (2012): 0.217. IF: 0.760.
10. **S. Fidanova**, O. Roeva. Metaheuristic Techniques for Optimization of an E. coli Cultivation Model. *Biotechnology & Biotechnological Equipment* 27(3). DIAGNOSIS PRESS LTD, **2013**, 3870 - 3876. ISSN: 1310-2818. IF: 0.760.
11. **S. Fidanova**, **M. Shindarov**, **P. Marinov**. Multi-Objective Ant Algorithm for Wireless Sensor Network Positioning. Proceedings of the Bulgarian Academy of Sciences 66(3), **2013**, 353 - 360. ISSN: 1310-1331, IF (2012): 0.211.
12. **Marinov, P.**, Zhang, S., Kutiev, I., Comparison of topside ionosphere scale height modeled by the Topside Sounder Model and incoherent scatter radar ionospheric model, Journal Advances in Space Research, 52(10), **2013**, 1717-1725. ISSN: 0273-1177. IF (2012) = 1.183. 5-year IF: 1.121.
13. **M. Nedjalkov**, P. Schwaha, S. Selberherr, J. M. Sellier, D. Vasileska. Wigner Quasi-Particle Attributes - An Asymptotic Perspective. *Applied Physics Letters* 102, **2013**, art. no. 163113, 163113-1 - 163113-4. ISSN: 0003-6951. IF (2012): 3.794. 5-year IF: 3.817.
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16. P. Schwaha, D. Querlioz, P. Dollfus, J. Saint-Martin, **M. Nedjalkov**, S. Selberherr. Decoherence effects in the Wigner function formalism. *Journal of Computational Electronics* 12 (3), **2013**, 388 - 396. ISSN: 1569-8025. IF (2012): 1.013.
17. P. Schwaha, J. M. Sellier, **M. Nedjalkov**, **I. T. Dimov**, S. Selberherr. The Ultimate Equivalence Between Coherent Quantum and Classical Regimes. Proceedings of the 16th International Workshop on Computational Electronics, **2013**, 152-153. ISBN: 978-3-901578-26-7.

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1. **A. Andreev,** M. Racheva. Two-sided bounds of eigenvalues of second- and fourth-order elliptic operators, Appl. Math. ISSN: 0862-7940. IF (2012): 0.222, 5-year IF: 0.549.
2. **S. Fidanova, P. Marinov**, M. Paprzycki. Influence of the Number of Ants on Multi-Objective Ant Colony Optimization Algorithm for Wireless Sensor Network Layout. – In: Proceedings of 9th International Conference on "Large-Scale Scientific

Computations" LSSC 2013, June 03 - 07, 2013, Sozopol, Bulgaria, Lecture Notes in Computer Science, Springer, Germany. ISSN: 0302-9743. SJR (2012): 0.332.

3. M. Magdics, L. Szirmay-Kalos, B. Tóth, **A. Penzov.** Analysis and Control of the Accuracy and Convergence of the ML-EM Iteration. – In: Proceedings of 9th International Conference on "Large-Scale Scientific Computations" LSSC 2013, June 03 - 07, 2013, Sozopol, Bulgaria, Lecture Notes in Computer Science, Springer, Germany. ISSN: 0302-9743. SJR (2012): 0.332.
4. Roeva O., **Fidanova S.**, Atanassova V., Hybrid ACO-GA for Parameter Identification of an E. coli Cultivation Process Model. – In: Proceedings of 9th International Conference on "Large-Scale Scientific Computations" LSSC 2013, June 03 - 07, 2013, Sozopol, Bulgaria, Lecture Notes in Computer Science, Springer, Germany. ISSN: 0302-9743. SJR (2012): 0.332.
5. P. Schwaha, **M. Nedjalkov**, S. Selberherr, J. M. Sellier, **I. T. Dimov, R. Georgieva**. Stochastic Formulation of Newton's Acceleration. – In: Proceedings of 9th International Conference on "Large-Scale Scientific Computations" LSSC 2013, June 03 - 07, 2013, Sozopol, Bulgaria, Lecture Notes in Computer Science, Springer, Germany. ISSN: 0302-9743. SJR (2012): 0.332.
6. J. M. Sellier, **M. Nedjalkov, I. T. Dimov**, S. Selberherr, The Role of Annihilation in a Wigner Monte Carlo approach. – In: Proceedings of 9th International Conference on "Large-Scale Scientific Computations" LSSC 2013, June 03 - 07, 2013, Sozopol, Bulgaria, Lecture Notes in Computer Science, Springer, Germany. ISSN: 0302-9743. SJR (2012): 0.332.
7. J.M. Sellier, **M. Nedjalkov**, **I. T. Dimov**, S. Selberherr. Decoherence and Time Reversibility:The Role of Randomness at Interfaces, *Journal of Applied Physics***,** 2013. ISSN 0021-8979. IF (2012): 2.21.
8. Sotirova E., Velizarova E., **Fidanova S.**, Atanasov K., Modeling Forest Fire Spread through a Game Method for Modeling Based on Hexagonal Cells. – In: Proceedings of 9th International Conference on "Large-Scale Scientific Computations" LSSC 2013, June 03 - 07, 2013, Sozopol, Bulgaria, Lecture Notes in Computer Science, Springer, Germany. ISSN: 0302-9743. SJR (2012): 0.332.
9. P. Szmeja, K. Wasielewska, M. Ganzha, M. Drozdowicz, M. Paprzycki, **S. Fidanova**, I. Lirkov, Reengineering and Extending the Agents in Grid Ontology. – In: Proceedings of 9th International Conference on "Large-Scale Scientific Computations" LSSC 2013, June 03 - 07, 2013, Sozopol, Bulgaria, Lecture Notes in Computer Science, Springer, Germany. ISSN: 0302-9743. SJR (2012): 0.332.

1.3. Публикации без реферирание и индексиране в световната система за реферирание, индексиране и оценяване (в световни вторични литературни източници)

1.3.1. Излезли от печат през 2013 г.

1. **Aleksandrov L.**, Djidjev H. Generation of SSH Traffic Data for IDS Testbeds. -In: Proc. of USENIX Security Workshop CSET'13, Berkeley, CA, USA: USENIX Assoc., **2013**.

2. **A. Andreev**, M. Balev, P.Ivanov, M. Racheva. On the Polynomial Spaces of Rectangular Morley Elements, International Conference UNITECH 2013, **2013**, Gabrovo, Vol. 2, 402-405.
3. **Fidanova S., Marinov P.**, Field Fire Simulation Applying Hexagonal Game Method, In Proc. of Information System and Grid Technology International Conference, Sofia, Bulgaria, **2013**, 201- 209. ISSN: 1314-4855.
4. Roeva O., Ts. Slavov, **S. Fidanova**, Population-based vs. Single Point Search Meta-heuristics for a PID Controller Tuning. - In: Handbook of Research on Novel Soft Computing Intelligent Algorithms: Theory and Practical Applications, P. Vasant (Ed.), (2 Volumes), IGI Global, 2014. pp. 1-1004. Web. 8 May. 2013. Doi:10.4018/978-1-4666-4450-2. ISBN-13: 9781466644502, ISBN-10: 1466644508. EISBN-13: 9781466644519, **2013**, 200 – 233.
5. Sotirova E., Bureva V., Velizarova E., **Fidanova S.**, **Marinov P.**, Atanassov K., Hexagonal Game Method Model of Forest Fire Spread with Intuitionistic Fuzzy Estimations, 17-th Int. Conf. on IFSs, Sofia 1-2 November 2013, Notes on Intuitionistic Fuzzy Sets, Vol. 19(3), **2013**, 73 - 80. ISSN 1310-4926.
6. Z. Zlatev, **I. T. Dimov,** K. G.. Sensitivity of European Pollution Levels to Changes of Human-made Emissions, Chapter of eBook entitled Advanced Numerical Methods for Complex Environmental Models: Needs and Availability (I. Farago, A. Havasi, Z. Zlatev, Eds), **2013**, eISBN: 978-1-60805-778-8, ISBN: 978-1-60805-777-1.
7. Z. Zlatev, K. Georgiev, **I. T. Dimov**. Parallel Computations in a Large-scale Air Pollution Model, Chapter of eBook entitled Advanced Numerical Methods for Complex Environmental Models: Needs and Availability (I. Farago, A. Havasi, Z. Zlatev, Eds), **2013**, eISBN: 978-1-60805-778-8, ISBN: 978-1-60805-777-1.

1.3.2. Приети за печат

1. **Fidanova S., Marinov P.**, Number of Ants Versus Number of Iterations on Ant Colony Optimization Algorithm for Wireless Sensor Layout. - In: Proc. of Int. Conf. on Robotics Automation and Mechatronics, RAM 2013, Bankya, Bulgaria.

1.5. Съставител на научен сборник

1.5.1. Излезли от печат през 2013 г.

1. Recent Advances in Computational Optimization, **S. Fidanova editor**, Studies in Computational Intelligence, Vol. 470, Springer, ISBN 978-3-319-00409-9, June **2013**.

1.7. *Съвместни публикации с чуждестранни учени*

1.7.1. Излезли от печат през 2013 г.

1. S. Ahmed, **M. Nedjalkov**, D. Vasileska. Comparative Study of Various Self-Consistent Event Biasing Schemes for Monte Carlo Simulations of Nanoscale MOSFETs. Book Chapter in: "Theory and Applications of Monte Carlo Simulations", V. Chan (ed.). Intech Open Access Publisher, **2013**, 109 – 133. ISBN: 978-953-51-1012-5. Doi: 10.5772/53113. *(глава от книга).*

2. **Aleksandrov L.**, Djidjev H. Generation of SSH Traffic Data for IDS Testbeds. -In: Proc. of USENIX Security Workshop CSET'13, Berkeley, CA, USA: USENIX Assoc., **2013**.
3. **Aleksandrov L.**, Djidjev H., Maheshwari A., Sack J.-R. An Approximation Algorithm for Computing Shortest Paths in Weighted 3-d Domains. *Discrete and Computational Geometry* 50 (1), **2013**, 124-184. ISSN: 0179-5376. SJR (2012): 1.088. IF (2012): 0.649. 5-year IF: 0.741.
4. S. Amoroso, L. Gerrer, A. Asenov, J. M. Sellier, **I. T. Dimov, M. Nedjalkov**, S. Selberherr. Quantum Insights in Gate Oxide Charge-Trapping Dynamics in Nanoscale MOSFETs. Proceedings of the 18th International Conference on Simulation of Semiconductor Processes and Devices, **2013**, 25 – 28. ISBN: 978-1-4673-5733-3.
5. **I. T. Dimov, R. Georgieva, Tz. Ostromsky**, Z. Zlatev. Sensitivity Studies of Pollutant Concentrations Calculated by UNI-DEM with Respect to the Input Emissions. Central European Journal of Mathematics, "Numerical Methods for Large Scale Scientific Computing" 11 (8), **2013**, 1531 – 1545. ISSN:1895-1074. Doi: 10.2478/s11533-013-0256-2. IF (2012): 0.405.
6. **I. T. Dimov, R. Georgieva, Tz. Ostromsky**, Z. Zlatev. Advanced Algorithms for Multidimensional Sensitivity Studies of Large-scale Air Pollution Models based on Sobol Sequences. Special issue of *Computers and Mathematics with Applications* 65 (3), "Efficient Numerical Methods for Scientific Applications". Elsevier, **2013**, 338 – 351. ISSN: 0898-1221. Doi: 10.1016/j.camwa.2012.07.005. IF (2012): 2.069. 5-year IF: 1.894.
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2. Взаимоотношения с институции / Експертна дейност

Наименование на материала		Име на автора
Рецензия за ОНС „Доктор”	*3 бр.*	**Проф. дн Иван Димов**
Становище за ОНС „Доктор”	*1 бр.*	
Рецензии в конкурс за доцент	*2 бр.*	
Рецензии в конкурс за професор	*2 бр.*	
Рецензия на проект с ФНИ	*2 бр.*	
Рецензии на статии за международни списания и поредици	*59 бр.*	
Рецензии на статии за международни списания и поредици	*17 бр.*	**Доц. д-р Пенчо Маринов**
Становище за ОНС „Доктор”	1 бр.	**Доц. д-р Стефка Фиданова**
Рецензии на статии за международни списания и поредици	*50 бр.*	
Рецензии на статии за международни списания и поредици	*1 бр.*	**Доц. д-р Цветан Остромски**

3. Организиране на международни конференции

През 2013 г. учени от секция „Паралелни алгоритми” са организирали следните специални сесии и минисимпозиуми:

- Минисимпозиум „*Back analysis and inverse problems*“ в рамките на третата международна конференция *International Conference on Computational Methods in Tunnelling and Subsurface Engineering* (EURO:TUN 2013, http://www.eurotun2013.rub.de/). Конференцията се проведе в Рурския университет в Бохум (РУБ), Германия, като един от съорганизаторите на форума, ***от 17 до 19 април 2013 г.*** Организатори на минисимпозиума бяха проф. Том Шанц (РУБ), **проф. дн Иван Димов (ИИКТ-БАН)** и доц. д-р Мария Дачева (ИМ-БАН, РУБ). Един от фокусите на минисимпозиума беше свързан с провеждане на анализ на чувствителността за математически модели, използвани при проектирането на прокопаване на тунели. В сесията бяха изнесени 9 доклада.

- В рамките на деветата международна конференция *Large-Scale Scientific Computations* (LSSC'13, http://parallel.bas.bg/Conferences/SciCom13/), която се проведе по традиция в Созопол ***от 3 до 7 юни 2013 г.,*** бяха организирани две специални сесии:

    - Специална сесия “*Applications of metaheuristics to large-scale problems*”

Организатори на сесията бяха **доц. д-р Стефка Фиданова (ИИКТ-БАН)** и Dr. Gabriel Luque (University of Malaga, Spain). В сесията бяха изнесени 14 доклада. Участниците бяха от 12 страни от три континента. Като ключов лектор участва проф. Карлос Кота от

Университета в Малага, Испания. Проф. Кота е световно известен учен в областта на метаевристичните алгоритми за решаване на оптимизационни задачи. Трудовете на конференцията ще бъдат отпечатани в поредицата *Lecture Notes in Computer Science* на Springer. Разширени версии на част от докладите ще бъдат публикувани в *International Journal of Metaheuristics*.

- Специална сесия "*Monte Carlo methods: theory, applications, and distributed computing*"

Организатори на сесията бяха **проф. дн Иван Димов, доц. дн Михаил Недялков** и д-р Жан Мишел Селие (**ИИКТ-БАН**). Тематиката на сесията включваше: теория на методите Монте Карло и квази-Монте Карло за многомерни интеграли, интегрални уравнения и задачи на линейната алгебра; паралелни реализации на алгоритми Монте Карло; методи Монте Карло за симулации на класически и квантов транспорт на електрони. В сесията бяха изнесени 6 доклада, а отделно беше проведена дискусия по методи Монте Карло, в която бяха изнесени още 3 доклада. Статиите от конференцията ще бъдат отпечатани в поредицата *Lecture Notes in Computer Science* на Springer.

- Шести семинар "*Workshop on Computational Optimization*" (https://fedcsis.org/2013/wco) в рамките на международната конференция *Federated Conference on Computer Science and Information Systems* (FedCSIS 2013, https://fedcsis.org/2013/. Конференцията се проведе в гр. Краков, Полша, ***от 8 до 11 септември 2013 г.*** Съорганизатор на семинара беше **доц. д-р Стефка Фиданова (ИИКТ-БАН)**. От постъпили общо 32 статии, след рецензиране от трима рецензенти за всяка статия, за докладване и публикуване в томовете на конференцията бяха допуснати 18 статии. Участниците бяха от 15 държави - 1 от САЩ, 1 от Япония и останалите от Европа. Трудовете на конференцията са отпечатани в IEEE Xplorer, а разширени версии на докладите ще бъдат отпечатани като глави от книга в поредицата на Springer *„Studies of Computational Intelligence"*.

5. РЕЗУЛТАТИ ОТ НАУЧНАТА ДЕЙНОСТ ПРЕЗ 2013г.:

7.1. *Най-важно и ярко научно постижение*

ЕФЕКТИВНИ МОНТЕ КАРЛО АЛГОРИТМИ

Разработени са ефективни Монте Карло алгоритми, основани на специална техника за рандомизиране на вектори, получени чрез квазислучайни редици. Алгоритмите са изследвани теоретично и са приложени за анализ на чувствителността на големи и свръхголеми изчислителни модели, като модели за изследване на екологични проблеми и модели на процеси в нано-структури.

Предложена е и е изследвана модификация на итеративен Монте Карло метод, наречен "метод на виртуални частици със знак". Методът е приложен успешно за моделиране на процеса на преход от квантово към класическо състояние на електрони в резултат на въздействието на случайни процеси, каквито са колебанията на полупроводниковата решетка. Този метод е един уникален резултат в областта на изследванията на електронен пренос в полупроводници, който отваря път към реалистични пълни квантови симулации в технологично приложими ситуации.

Създадени са модели за синтезиране на някои фармацевтични продукти като инсулин, интерферони, ензими и др. на базата на система от параметрични диференциални уравнения, описващи развитието на микроорганизмите. Разработени са и са приложени разнообразни стохастични алгоритми за решаването на тази трудна оптимизационна задача.

Разработен е стохастичен алгоритъм на базата на метода на мравките за построяване на безжична сензорна мрежа. В тази задача за многообектната оптимизация се търси решение с минимален брой сензори и минимална консумация на енергия, при условие, че има пълно покритие на наблюдаваната област. Направеното сравнение с резултатите, постигнати от други автори при решаването на тази задача, показва по-високата ефективност на предложеният алгоритъм спрямо другите подходи.

Резултатите са публикувани в 5 глави от книги, както и в 19 статии в специализирани международни списания и поредици, като: а) *Computers and Mathematics with Applications;* б) *Central European Journal of Mathematics;* в) *Journal of Applied Physics;* г) *Journal of Computational Electronics; д*) *Springer, Lecture Notes in Computer Science,* и *Springer Proceedings in Mathematics & Statistics*. Седем от публикациите са в списания с импакт-фактор и шест са в издания с SJR импакт ранг. Получените резултати са в рамките на три проекта, финансирани от Фонд „Научни изследвания", и два проекта, финансирани от Европейската комисия.

Ръководител на разработката е проф. дн Иван Димов.

7.2. ***Най-важно и ярко научно-приложно постижение***

МОДЕЛИРАНЕ НА АКТУАЛНИ ПРОБЛЕМИ НА ОКОЛНАТА СРЕДА, КАТО ПРЕНОС НА ЗАМЪРСИТЕЛИ ВЪВ ВЪЗДУХА И ПОЖАРИ

Разработен е модел, симулиращ разпространението на горски и полски пожари. Моделът е на базата на игровото моделиране. Моделът е тестван първо в област с еднородна растителност и без вятър, за да се установи дали получените резултати са реалистични, след което е включен и вятър. Наблюдавано е изменението на фронта на пожара при различните условия. Разработена е паралелна версия на програмата, реализираща модела. Изградена е методика за оценка на горимите материали с помощта на GIS инструменти, които да отговарят на съществуващите класификации. Разработени са тестови случаи на територията на община Златоград и Харманли.

Описани са симулации на систематичните промени на емисиите от човешка дейност в Европа. За симулациите са приложени внимателно избрани серии от възможни сценарии. Проучено е въздействието на тези промени върху нивата на замърсяване в различни части от Европа. Едно от заключенията в резултат на проведените числени експерименти е, че промените в различните части на Европа могат да бъдат твърде различни, въпреки че емисиите се редуцират с еднакъв показател. Някои идеи и за бъдещи изследвания са дискутирани накратко.

Проведени са голям брой числени експерименти със специално пригодената за целта версия на модела SA-DEM за далечен пренос на замърсители във въздуха. Първоначално тя бе реализирана и оптимизирана за работа върху суперкомпютъра IBM BlueGene/P, на който се проведоха голям брой тежки изчислителни експерименти. В последствие тя бе реализирана и върху значително по-мощния клъстър IBM MareNostrum III на Суперкомпютърния център в Барселона, Испания (BSC). Усъвършенстваната последна версия на SA-DEM е с три йерархични нива на паралелизъм, позволяващи по-ефективна работа и върху най-мощните съвременни суперкомпютри от клъстърен тип. Това даде възможност да се направят множество успешни експерименти върху различен брой процесори на MareNostrum и с версията на SA-DEM с най-фината мрежата за дискретизация на областта, която създаваше известни проблеми при изпълнение върху IBM BlueGene/P. Получените

резултати показват ефективността и добрата скалируемост на новата реализация на SA-DEM.

Резултатите са получени в рамките на четири проекта, финансирани от Фонд „Научни изследвания", и са публикувани в 2 глави от книги и в 8 статии в специализирани международни списания и поредици, от които 2 са в списания с импакт-фактор и 5 - в издания с SJR импакт ранг.

Ръководител на разработката е доц. д-р Стефка Фиданова.

6. МЕЖДУНАРОДНО НАУЧНО СЪТРУДНИЧЕСТВО НА ЗВЕНОТО:

6.2. В рамките на договори и спогодби на институтско ниво.

- Empowering Young Explorers, ***EYE***, Coordination and support action funding scheme, FP7-ICT-2013-C, договор 619241, 2013 – 2015, финансиран от Европейската комисия (ръководител: проф. дн Иван Димов, секция „Паралелни алгоритми");

  Целта на проекта EYE е да се изгради дълготрайна европейска общност от високо квалифицирани и способни млади изследователи, които са в състояние да генерират напълно нови идеи и да изградят изследователски сътрудничества в интердисциплинарни области. Проектът EYE ще им помогне да развият своя научен потенциал и способността им за разработване на нов изследователски план за „бъдещи новопоявяващи се технологии" (FET). По - конкретно, EYE се фокусира върху (а) научни и технологични идеи с висок риск, които могат да бъдат генерирани чрез „мозъчна атака", (б) сътрудничество между младите учени в различни дисциплини и от различни части на Европа, и (в) върху самите млади учени, като се развива техния лидерски потенциал чрез изграждане на изследователски мрежи и обучение в специфични методи, използвани в проекти за европейско сътрудничество. Тематичният обхват на проекта се определя от 9 мултидисциплинарни научни области, наложени от текущата дискусия относно „бъдещите новопоявяващи се технологии", както и в рамките на програмата Horizon 2020. В частност, EYE ще търси области, в които информационните и комуникационните технологии (ИКТ) могат да доведат до нови възможности за интердисциплинарни изследвания и ще поддържат както любопитството и предизвикателствата, така и планираните изследвания.

- Съвременните пресмятания в полза на иновацията, ***AComIn***, FP7 Capacity Programme, Research Potential of Convergence Regions, FP7-REGPOT-2012-2013-1, договор 316087, 2012 – 2015, финансиран от Европейската комисия (ръководител: проф. дн Галя Ангелова, секция „Лингвистично моделиране");
- ***GOES*** 070401/2010/579105/SUB/C4, 2010 – 2013, финансиран от Европейската комисия (ръководител: гл. ас. д-р Нина Добринкова, секция „Комуникационни системи и услуги").

НАЦИОНАЛНИ ПРОЕКТИ

- *„Монте Карло методи, паралелни алгоритми и приложения“, бюджетен проект* (ръководител: проф. дн Иван Димов, секция „Паралелни алгоритми“, ИИКТ-БАН)

- „*Симулиране поведението на горски и полски пожари*“, ФНИ, Договор #И-01/6, 2012 – 2014 (ръководител: доц. д-р Пенчо Маринов, секция „Паралелни алгоритми“, ИИКТ-БАН), 2012 – 2014

- *„Разработване и изследване на нови методи Монте Карло за моделиране на сложни системи“*, НФНИ, Договор #ДМУ 03/61, 2011-2013 (ръководител: гл. ас. д-р Райна Георгиева, секция „Паралелни алгоритми“, ИИКТ-БАН)

- *„Ефективни Монте Карло методи за големи научно-изследователски задачи“*, НФНИ, Договор #DTK 02/44, 2009-2012 (ръководител: проф. дн Иван Димов, секция „Паралелни алгоритми“, ИИКТ-БАН)

- *„Център за върхови научни постижения SuperCA++“*, НФНИ, Договор #DCVP 02/1, 2010-2013 (ръководител: проф. дн Св. Маргенов, секция „Научни пресмятания“, ИИКТ-БАН)

- *„Моделиране на процеси с фиксирани правила за развитие МодПроФикс“*, НФНИ, Договор ДИД-02/29, 2010-2013 (ръководител: проф. Кр. Атанасов, ИБФБМИ – БАН; доц. д-р Стефка Фиданова, секция „Паралелни алгоритми“, координатор за ИИКТ-БАН)

ЧЛЕНСТВО В НАУЧНИ ОРГАНИЗАЦИИ

- Съюз на математиците в България
- IMACS (Technical committee on Monte Carlo methods)
- SIAM
- Marie Curie Fellowship Association
- EU/ME European Chapter on Metaheuristics - Euro Working Group
- Italian Physical Society

Участие през 2013 г. в международни конференции с доклади или съавторство

Дата на провеждане		Място на провеждане *(град, държава*	Наименование на конференцията	Наименование и автор на доклада
Ден	Месец			
=1=	=2=	=3=	=4=	=5=
17-19	04	Ruhr University, Bochum, Germany	EUROTUN 2013, 3rd International Conference on Computational Methods in Tunnelling and Subsurface Engineering	"Sobol Global Sensitivity Analysis: Backgro Algorithms and Applications", I. T. Di Georgieva
07-12	04	Vienna, Austria	EGU General Assembly 2013	"The Upgraded European Digital Upper Atm new DIAS products for the high latitude ion topside ionosphere and the plasmasphere" Kutiev, B. Zolesi, I. Tsagouri, D. Dialetis, P Fidanova, L. Cander, M. Pietrella, K. Tziotz Lykiardopoulos; "POPDAT-project opportunities in studying wave-like density structures", L. Bankov, K Crespon, D. Dudkin, C. Ferencz, A. Girenk A. Kuzmych, G. Lizunov, P. Marinov, O. Pi D. Przepiórka, H. Rothkaehl, T. Shtus, P. S Sterenharz, A. Vassileva; "Project POPDAT: concept and first resu Bankov, C. François, D. Dudkin, C. Ferenc Korepanov, A. Kuzmych, G. Lizunov, P. M Piankova, I. Price, D. Przepiórka, H. Rothka Steinbach, A. Sterenharz, A. Vassileva
31-01	05-06	София, България	Information System and Grid Technologies International Conference, ISGT	"Field Fire Simulation Applying Hexagonal S. Fidanova, P. Marinov; "POPDAT opportunities in studying the ionosphere w structures",
3-7	06	Созопол, България	9th International Conference on "Large-Scale Scientific Computations"	"Sensitivity Studies of a Large-Scale Air Po Approximation Techniques and Monte Carl T. Dimov, R. Georgieva, P. Marinov, Tz. O Zlatev; "Field Fire Simulation Applying Hexagonal S. Fidanova, P. Marinov, M. Paprzycki; "Hybrid ACO-GA for Parameter Identificatio Cultivation Process Model", O. Roeva, S. F Atanassova; "Reengineering and Extending the Agents i Ontology", P. Szmeja, K. Wasielewska, M. Drozdowicz, M. Paprzycki, S. Fidanova; "Modeling Forest Fire Spread thro Method for Modeling Based on Hexagonal Sotirova, E. Velizarova, S. Fidanova, K. At "Stochastic Alternative to Ne Acceleration", P. Schwaha, M. Nedjalkov, Dimov, R. Georgieva; "The Role of Annihilation in a W Carlo Approach", J. M. Sellier, M. Nedjalko Selberherr; "Sensitivity Study of a Large-Scale Air Poll Respect to Various Input Data Sets, Based Performance Computations", Tz. Ostroms Georgieva, P. Marinov, Z. Zlatev "Analysis and Control of the Accuracy a of the MEM Iteration", M. Magdics, L. Szirma Tóth, A. Penzov

Дата на провеждане		Място на провеждане (*град, държава*)	Наименование на конференцията	Наименование и автор на доклада
Ден	Месец			
24-29	06	Албена, България	AmiTaNS'13	"Sensitivity Study of a Large-Scale Air Pollution Mo Using High-Performance Computations and Monte Algorithms", Tz. Ostromsky, I. Dimov, R. Georgiev Marinov, Z. Zlatev
07-08	06	Созопол, България	Symposium in honor of Raytcho Lazarov's 40 years research in Computational Methods and Applied Mathematics	"Multidimensional Sensitivity Analysis of Large-sca Mathematical Models", I.T. Dimov, R. Georgieva
15-19	07	Annecy-le-Vieux, France	Ninth IMACS Seminar on Monte Carlo Methods	"Advanced Monte Carlo Algorithms for Solving Equations", I. T. Dimov, R. Georgieva; "Efficient Monte Carlo algorithms with applica sensitivity analysis", I. T. Dimov, R. Georgieva; "Algorithm Parameters Sensitivity of Monte Algorithm for E.coli Cultivation Process Mode Fidanova; "A Monte Carlo Method for S Analysis of an Air Pollution Model - implem performance and results", Tz. Ostromsky, I. D Georgieva
08-11	09	Krakow, Poland	FEDERATED CONFERENCE ON COMPUTER SCIENCE AND INFORMATION SYSTEMS (FedCSIS 2013)	"Influence of the Population Size on the Genetic Al Performance in Case of Cultivation Process Mode Roeva O., Fidanova S., Paprzycki M.