ОТЧЕТ НА СЕКЦИЯ „ПАРАЛЕЛНИ АЛГОРИТМИ“ ЗА 2015 Г.

РЪКОВОДИТЕЛ: ПРОФ. ДН ИВАН ДИМОВ

1. Публикационна дейност

1.1. Научни публикации, които са реферирани и индексирани в световната система за реферирање, индексиране и оценяване – излезли от печат

1. **Andreev, A.B.**, Racheva, M.R.. On a Type of Nonconforming Morley Rectangular Finite Element. Lecture Notes in Computer Science, 8962, Springer, 2015, ISBN:978-3-319-15584-5, ISSN:0302-9743, DOI:10.1007/978-3-319-15585-2_32, 287 - 294. SJR:0.32

2. **Andreev, A.B.**, Racheva, M.R.. The Effect of a Postprocessing Procedure to Upper Bounds of the Eigenvalues. Lecture Notes in Computer Science, 8962, Springer, 2015, ISSN:03029743, DOI:10.1007/978-3-319-15585-2_31, 273 - 281. SJR:0.339

3. Belehaki A., Tsagouri I., Kutiev I., **Marinov P.**, Zolesi B., Pietrella M., Themelis K., Elias P., Tziotziou K.. The European Ionosonde Service: Nowcasting and forecasting ionospheric conditions over Europe for the ESA Space Situational Awareness services. Journal of Space Weather and Space Climate, 5, 2015, ISSN:2115-7251, DOI:10.1051/swsc/2015026, A.25p1 - A25p22. SJR:1.11, ISI IF:2.558

4. Cervenka J. , P. Ellinghaus, **Nedjalkov M.**, Langer E.. Optimization of the Deterministic Solution of the Discrete Wigner Equation. Lecture Notes in Computer Science, Springer International Publishing, 2015, ISBN:ISBN: 978-3-319-2651, DOI:doi:10.1007/978-3-319-26520-9_29., SJR:0.31

5. Cervenka J., Ellinghaus P., **Nedjalkov M.**. Deterministic Solution of the Discrete Wigner Equation. Lecture Notes in Computer Science, 8962, Springer International Publishing, 2015, ISBN:ISBN: 978-3-319-1558, DOI:doi:10.1007/978-3-319-15585-2_17., SJR:0.339

6. Chernogorova, T., **Dimov, I. T.**, Vulkov, L.. A splitting numerical method for primary and secondary pollutant models. Lecture Notes in Computer Science, 9374, Springer Berlin Heidelberg, 2015, ISBN:978-3-319-26519-3; O, ISSN:0302-9743, DOI:10.1007/978-3-319-26520-9_35, 303 - 311. SJR:0.31

7. **Dimov, I. T.**, Maire, S., **Sellier, J. M.**. A New Walk on Equations Monte Carlo Method for Linear Algebraic Problems. Applied Mathematical Modelling, 39, 15(2015), 2015, ISSN:0307-904X, 4494 - 4510. ISI IF:2.251

8. **Dimov, I. T.**, **Nedjalkov, M.**, **Sellier, J. M.**, Selberherr, S.. Boundary conditions and the Wigner equation solution. Journal of Computational Electronics, 14, 4(2015), 2015,

ISSN:1569-8025 (print version), 1572-8137 (Online), DOI:10.1007/s10825-015-0720-2, 859 - 863. ISI IF:1.52

9. **Dimov, I. T.**, **Sellier, J. M.**, **Ivanova, D.Y.**. Molecular descriptors and quasi-distribution functions. Computers and Mathematics with Applications, 70, 11(2015), 2015, ISSN:0898-1221, DOI:10.1016/j.camwa.2015.06.037, 2726 - 2731. ISI IF:1.697

10. **Dimov, I. T.**, **Sellier, J. M.**, **Nedjalkov, M.**, Selberherr, S. A Comparison of Approaches for the Solution of the Wigner Equation. Mathematics and Computers in Simulations, 107, 2015, ISSN:0378-4754, DOI:10.1016/j.matcom.2014.06.001, 108 - 119. ISI IF:1.033

11. **Dimov, I. T.**, **Sellier, J. M.**. A sensitivity study of the Wigner Monte Carlo method. Journal of Computational and Applied Mathematics, 277, 2015, ISSN:0377-0427, DOI:10.1016/j.cam.2014.09.010, 87 - 93. ISI IF:1.672

12. **Dimov, I.**, **Sellier, J. M.**. Toward solotronics design in the Wigner formalism. Physica A: Statistical Mechanics and its Applications, 417, 2015, ISSN:0378-4371, DOI:10.1016/j.physa.2014.09.057, 287 - 296. ISI IF:1.722

13. Ellinghaus P., **Nedjalkov M.**, Selberherr, S. Optimized Particle Regeneration Scheme for the Wigner Monte Carlo Method. Lecture Notes in Computer Science, 8962, Springer, 2015, ISBN:978-3-319-15584-5, DOI:doi:10.1007/978-3-319-15585-2_3., 27 - 33. SJR:0.339

14. Ellinghaus P., **Nedjalkov M.**, Selberherr, S. The Influence of Electrostatic Lenses on Wave Packet Dynamics. Lecture Notes in Computer Science, 9374, Springer International Publishing, 2015, ISBN:ISBN: 978-3-319-2651, DOI:doi:10.1007/978-3-319-26520-9_30, 277 - 284. SJR:0.339

15. Ellinghaus P., **Nedjalkov M.**. Improved Drive-Current into Nanoscaled Channels using Electrostatic Lenses. Proceedings of the 20th International Conference on Simulation of Semiconductor Processes and Devices (SISPAD), 2015, ISBN:978-1-4673-7860-4, DOI:doi:10.1109/SISPAD.2015.7292249., 24 - 27

16. Ellinghaus P., **Nedjalkov M.**. Memory-efficient Particle Annihilation Algorithm for Wigner Monte Carlo Simulations. Proceedings of the 2015 International Workshop on Computational Electronics (IWCE), 2015, ISBN:ISBN: 978-0-692-5152, DOI:doi:10.1109/IWCE.2015.7301955.

17. Ellinghaus, P., Weinbub, J., **Nedjalkov M.**, Selberherr, S, **Dimov I.**. Distributed-Memory Parallelization of the Wigner Monte Carlo Method Using Spatial Domain Decomposition. Journal of Computational Electronics, 2015, ISSN:1569-8025, DOI:doi:10.1007/s10825-014-0635-3., 151 - 162. ISI IF:1.52

18. **Fidanova S.**, **Ilcheva Z.**. Application of Ants Ideas on Image Edge Detection. Lecture Notes in Computer Science, 9374, Springer, 2015, ISBN:978-3-319-26519-3, ISSN:0302-9743, DOI:10.007/978-3-319-26520-9, 218 - 225. SJR:0.339

19. **Fidanova S.**, Mucherino A., Ganzha M.. Ant Colony Optimization with Environment Changes: An Application to GPS Surveying. FedCSIS'2015, EEE Xplorer, 2015, ISBN:ISBN 978-83-60810-66, ISSN:2300-5963, DOI:DOI 10.15439/2015F33, 495 - 500

20. **Fidanova S.**, Pop P.. An Ant Algorithm for the Partitioned Graph Coloring Problem. Lecture Notes in Computer Science, 8962, Springer, 2015, ISBN:ISBN 978-3-319-15584, ISSN:ISSN 0302-9743, DOI:0.1007/978-3-319-15585-2, 78 - 84. SJR:0.339

21. **Kapanova, K.G.**, **Dimov, I**, **Sellier, J.M.**. On randomization of neural networks as a form of post-learning strategy. Soft Computing, Springer, 2015, ISSN:1433-7479, DOI:10.1007/s00500-015-1949-1, ISI IF:1.271

22. **Marinov P.**, Kutiev I., Belehaki A., Tsagouri I.. Modeling the plasmasphere to topside ionosphere scale height ratio. J. Space Weather Space Clim.,, 5, A27, 2015, ISSN:2115-7251, DOI:DOI: 10.1051/swsc/2015028, A27p1 - A27p12. ISI IF:2.558

23. **Nedjalkov M.**, Weinbub J. , P. Ellinghaus, S. Selberherr. The Wigner Equation in the Presence of Electromagnetic Potentials. Journal of Computational Electronics, 2015, ISSN:1569-8025, DOI:doi:10.1007/s10825-015-0732-y., ISI IF:1.52

24. **Ostromsky, Tz.**, **Dimov, I. T.**, Alexandrov, V., Zlatev, Z.. Preparing Input Data for Sensitivity Analysis of an Air Pollution Model by using High-Performance Supercomputers and Algorithms. Computers & Mathematics with Applications, 70, 11, Elsevier, 2015, ISSN:0898-1221, DOI:10.1016/j.camwa.2015.07.020, 2773 - 2782. SJR:1.121, ISI IF:1.697

25. Roeva O., **Fidanova S.**, Paprzycki M.. Population Size Influence on the Genetic and Ant Algorithms Performance in Case of Cultivation Process Modelling. Recent Advances in Computational Optimization: Results of the Worcshop on Computational Optimization WCO 2013, Studies in Computational Intelligence, 580, Springer, 2015, ISBN:978-3-319-12630-2, ISSN:1860-949X, DOI:10.007/978-3-319-12631-9_7, 107 - 120. SJR:0.235

26. Roeva O., Vassilev P., **Fidanova S.**, Gepner P.. InterCriteria Analysis of a Model Parameters Identification Using Genetic Algorithm. FedCSIS'2015, EEE Xplorer, 2015, ISBN:978-83-60810-66-1, ISSN:2300-5963, DOI:10.15439/2015F233, 501 - 506

27. **Sellier, J. M.**, **Dimov, I. T.**. On the simulation of indistinguishable fermions in the many-body Wigner formalism. Journal of Computational Physics, 280, 2015, ISSN:0021-9991, 287 - 294. SJR:1.921, ISI IF:3.184

28. **Sellier, J. M.**, **Dimov, I. T.**. Wigner functions, signed particles, and the harmonic oscillator. Journal of Computational Electronics, 14, 4(2015), 2015, ISSN:1569-8025, 907 - 915. ISI IF:1.52

29. **Sellier, J. M.**, **Nedjalkov, M.**, **Dimov, I. T.**. An introduction to applied quantum mechanics in the Wigner Monte Carlo formalism. Physics Reports, 577, 2015, ISSN:0370-1573, DOI:10.1016/j.physrep.2015.03.001, 1 - 34. ISI IF:22.91

30. **Sellier, J. M.**, Sviercoski, R. F., **Dimov, I. T.**. On the Wigner Monte Carlo Method Coupled to Pseudopotential Models. Journal of Computational and Applied Mathematics, 293, 2015, ISSN:0377-0427, DOI:10.1016/j.cam.2015.01.033, 217 - 222. ISI IF:1.266

31. Wang L. , A. Brown, **Nedjalkov M.**, Alexander C, B. Cheng, C. Millar, A. Asenov:. Impact of Self-Heating on the Statistical Variability in Bulk and SOI FinFETs. IEEE Transactions on Electron Devices, 2015, ISSN:0018-9383, DOI:doi:10.1109/TED.2015.2436351, ISI IF:2.47

32. Wang L. , A. R. Brown, **Nedjalkov M.**, Alexander C., B. Cheng, C. Millar, A. Asenov.. 3D Electro-Thermal Simulations of Bulk FinFETs with Statistical Variations. Proceedings of the 20th International Conference on Simulation of Semiconductor Processes and Devices (SISPAD), 2015, ISBN:978-1-4673-785, DOI:DOI: 10.1109/SISPAD.2015.7292271

33. Wang l., T. Sadi, **Nedjalkov M.**, Brown A.R., C. Alexander, B. Cheng, C. Millar, A. Asenov.. An Advanced Electro-Thermal Simulation Methodology For Nanoscale Device. Proceedings of the 2015 International Workshop on Computational Electronics (IWCE), 2015, ISBN:ISBN: 978-0-692-5152, DOI:DOI: 10.1109/IWCE.2015.7301989

34. Weinbub J., Ellinghaus P., **Nedjalkov M.**. Domain Decomposition Strategies for the Two-Dimensional Wigner Monte Carlo Method. Journal of Computational Electronics, 2015, ISSN:1569-8025, DOI:doi:10.1007/s10825-015-0730-0, ISI IF:1.52

35. Zlatev, Z., **Georgiev, K.**, **Dimov, I.**. Selecting Explicit Runge-Kutta Methods with Improved Stability Properties. Lecture Notes in Computer Science, 9374, Springer International Publishing, 2015, ISSN:978-3-319-26519-3; Online ISBN978-3-319-26520-9, DOI:10.1007/978-3-319-26520-9_46, 409 - 416. SJR:0.34

1.2. Научни публикации, които са реферирани и индексирани в световната система за реферирane, индексиране и оценяване - приети за печат

1. **Dimov, I. T.**, **Todorov, V.**. Error Analysis of Biased Stochastic Algorithms for the Second Kind Fredholm Integral Equation. Studies in Computational Intelligence, Springer, приета за печат: 2015, SJR:0.24

2. **Fidanova S.**, Pop P.. An Improved Hybrid Ant-Local Search Algorithm for the Partition Graph Coloring Problem. Computational and Applied Mathematics, 293, Elsevier, приета за печат: 2015, ISSN:0377-0427, DOI:10.1016/j.cam.2015.04.030, 55 - 61. SJR:1.104, ISI IF:1.266

3. **Fidanova S.**. Metaheuristic Method for Transport Modelling and Optimization. Studies in Computational Intelligence, Springer, приета за печат: 2015, ISSN:1860-949X, SJR:0.235

4. Roeva O., **Fidanova S.**, Paprzycki M.. InterCriteria Analysis of ACO and GA Hybrid Algorithms. Studies in Computational Intelligence, 610, Springer, приета за печат: 2015, ISBN:978-3-319-21132-9, ISSN:1860-949X, DOI:10.1007/978-3-319-21132-9, 107 - 126. SJR:0.235

5. Zlatev, Z., **Dimov, I.**, **Lirkov, I.**. Efficient numerical methods for large-scale scientific computations: Introduction. Journal of Computational and Applied Mathematics, 293, Elsevier, приета за печат: 2015, ISSN:0377-0427, DOI:10.1016/j.cam.2015.05.001, 1 - 6. SJR:1.104, ISI IF:1.266

1.3 Сборници, броеве на списания, енциклопедии, речници, справочници - излезли от печат

№	вид на продукта	Категория	Наименование	Характеристики	Участници	Забележка
1	Сборник трудове от научен форум	Международно	Numerical Methods and Applications	**Издателство**: Springer International Publishing AG Switzerland, **ISBN**: 978-3-319-15584-5, **ISSN**: 0302-9743	**Димов, И.** - Редактор **Фиданова, С.** - Редактор **Лирков, И.** - Редактор	
2	Тематичен сборник	Международно	Recent Advances in Computational Optimization, Results of the Workshop on Computational Optimization WCO 2013	**Издателство**: Springer, **ISBN**: 978-3-319-12630-2	**Фиданова, С.** - Гост-редактор	

1.4 Сборници, броеве на списания, енциклопедии, речници, справочници - приети за печат

№	вид на продукта	Категория	Наименование	Характеристики	Участници
1	Брой от списание	Международно	Efficient Numerical Methods for Large-scale Scientific Computations	**Издателство**: Elsevier, **ISSN**: 0377-0427	Zlatev, Z. - Гост-редактор **Димов, И.** - Гост-редактор **Лирков, И.** - Гост-

					редактор
2	Тематичен сборник	Международно	Recent Advances in Computational Optimization, Results of the Workshop on Computational Optimization WCO 2014	**Издателство**: Springer, **ISBN**: 978-3-319-21132-9	**Фиданова, С.** - Гост-редактор

1.5. Цитати на научни публикации

Брой цитирани публикации: 75	**Брой цитиращи източници: 188**

1984

1. **Andreev A. B.**, Lazarov R. D., Hatri M.. Superconvergence of the gradients in the finite element method for some elliptic and parabolic problems. Variational-Difference Methods in Mathematical Physics, Part II, 1984, 13 - 25

   Цитира се в:

   1. R Jari, L Mu , Superconvergence of H (div) finite element approximations for the Stokes problem by local L2-projection methods, Journal of Computational and Applied Mathematics, 2015, Volume 278, pp. 278–292., **@2015**

1992

2. **Andreev A. B.**, Kascieva V. A., Vanmaele M.. Some results in lumped mass finite-element approximation of eigenvalue problems using numerical quadrature formulas. Journal of Computational and Applied Mathematics, 43, 3, Elsevier, 1992, ISSN:03770427, 291 - 311. SJR:1.104

   Цитира се в:

   2. Lee, Changwoo. "Novel approach to predict the varying thicknesses of a PVA film during a roll-to-roll process." International Journal of Mechanical Sciences 92 (2015): 52-69., **@2015**
   3. Pieper, Konstantin. Finite element discretization and efficient numerical solution of elliptic and parabolic sparse control problems. Diss. PhD Dissertation, Technische Universität München, 2015., **@2015**

1993

3. **Dimov, I. T.**, Tonev, O.. Monte Carlo algorithms: performance analysis for some

computer architectures. Journal of Computational and Applied Mathematics, 48, 3, Elsevier, 1993, DOI:10.1016/0377-0427(93)90024-6, 253-277 - 277. ISI IF:1.266

Цитира се в:

4. Tian, Y., Yan, Z. Z., & Hong, Z. M. (2015). A new method for solving a class of heat conduction equations. Thermal Science, 19(4), 1205-1210., **@2015**

1994

4. Kutiev, I., Stankov, S., **Marinov, P.**. Analytical expression of O+H+ ion transition surface for use in IRI. Advances in Space Research, 14, 12, 1994, ISSN:0273-1177, DOI:DOI: 10.1016/0273-1177(94)90254-21994, 135 - 138. ISI IF:1.183

Цитира се в:

5. Tulasi Ram, S., Heelis, R., Gowtam, V.S., Ajith, K.K., Su, S.-Y. Unique latitudinal shape of ion upper transition height (HT) surface during deep solar minimum (2008-2009) (2015) Journal of Geophysical Research A: Space Physics, 120 (2), pp. 1419-1427., **@2015**

1998

5. **Karaivanova, A.**, **Dimov, I. T.**. Error analysis of an adaptive Monte Carlo method for numerical integration. Mathematics and Computers in Simulation, 47, 2-5, Elsevier, 1998, ISSN:0378-4754, DOI:10.1016/S0378-4754(98)00103-7, 201 - 213. ISI IF:0.949

Цитира се в:

6. Perkó, Z. (2015). Sensitivity and Uncertainty Analysis of Coupled Reactor Physics Problems: Method Development for Multi-Physics in Reactors (Doctoral dissertation, TU Delft, Delft University of Technology)., **@2015**

6. **Dimov, I. T.**, Dimov, T.T., **Gurov, T.V.**. A new iterative Monte Carlo approach for inverse matrix problem. Journal of Computational and Applied Mathematics, 92, 1, Elsevier, 1998, DOI:10.1016/S0377-0427(98)00043-0, 15-35 - 35. ISI IF:1.266

Цитира се в:

7. Yi TIAN, Zai-Zai YAN and Zhi-Min HONG, A New Method for Solving a Class of Heat Conduction Equations, Open Access Journal THERMAL SCIENCE, Year 2015, Vol. 19, No. 4, pp. 1205-1210, ISSN: 0354-9836, eISSN: 2334-7163, DOI: 10.2298/TSCI1504205T, IF 1.222 (2014), **@2015**

8. Rahman Farnoosh, Mahboubeh Aalaei, Morteza Ebrahimi, Combined probabilistic algorithm for solving high dimensional problems, Stochastics An International Journal of Probability and Stochastic Processes, 2015; Vol. 87 (1), pp. 30-47, DOI: 10.1080/17442508.2014.914515 , IF: 0.515, **@2015**

7. **Dimov, I. T.**, **Karaivanova, A.**. Parallel computations of eigenvalues based on a Monte Carlo approach. Monte Carlo Methods and Applications, 4, VSP, Berlin, Germany : De Gruyter, 1998, ISSN:0929-9629, 33 - 52

   Цитира се в:

   9. Weng, P. C. Y., & Phoa, F. K. H. (2015). Small-sample statistical condition estimation of large-scale generalized eigenvalue problems. Journal of Computational and Applied Mathematics, Vol. 298, ISSN 0377-0427, IF 1.266, SJR 1.104, **@2015**

1999

8. Faure C., Dutto P., **Fidanova S.**. Odysee and parallelism : Extention and Validation,. European Conf. on Numerical mathematics and Advanced Applications, World Sciantific, 1999, 478 - 485

   Цитира се в:

   10. Towara M., Schanen M., Naumann U., MPI-parallel discrete adjoint OpenFOAM, Pocedia Computer Science Vol. 51(1), ISSN 1877-0509, Elsevier, 2015, pp. 19-28, **@2015**

2000

9. Kosina H., **Nedjalkov M.**, Selberherr, S. "Theory of the Monte Carlo Method for Semiconductor Device Simulation. IEEE Transactions on Electron Devices, 2000, DOI:doi:10.1109/16.870569., ISI IF:2.47

   Цитира се в:

   11. Chaudhuri, Sourindra Mohan. Efficient device simulation and power optimization techniques for novel finfet circuit design. Diss. PRINCETON UNIVERSITY, 2015., **@2015**

   12. Илларионов, Юрий Юрьевич. "ТУННЕЛЬНЫЙ ТРАНСПОРТ НОСИТЕЛЕЙ И СВЯЗАННЫЕ С НИМ ФИЗИЧЕСКИЕ ЯВЛЕНИЯ В СТРУКТУРАХ ЗОЛОТО–ФТОРИД КАЛЬЦИЯ–КРЕМНИЙ (111)."диссертация ... кандидата физико-математических наук: 01.04.10, Физико-технический институт им. А.Ф. Иоффе]- Санкт-Петербург., **@2015**

2001

10. **Dimov, I. T.**, Aleksandrov, V., **Karaivanova, A.**. Parallel resolvent Monte Carlo algorithms for linear algebra problems. Mathematics and Computers in Simulation, 55, 1-3, Elsevier, 2001, ISSN:0378-4754, DOI:10.1016/S0378-4754(00)00243-3, 25 - 35.

ISI IF:0.949

Цитира се в:

13. Farnoosh, R. and Aalaei, M. and Ebrahimi, M., Combined probabilistic algorithm for solving high dimensional problems, Stochastics, 2015, 87 (1), pp. 30-47, ISSN: 1744-2508, DOI: 10.1080/17442508.2014.914515, IF: 0.515, **@2015**

14. Farnoosh, R. and Aalaei, M., New adaptive Monte Carlo algorithm for parallel solution of large linear systems with applications, Proceedings of the Romanian Academy Series A - Mathematics Physics Technical Sciences Information Science, 2015, 16 (1), pp. 11-19, ISSN: 1454-9069, IF: 1.658, **@2015**

2002

11. **Fidanova S.**. Evolutionary Algorithm for Multiple Knapsack Problem. Parallel Problems Solving From Nature, Real World Optimization Using Evolutionary Computing, 2002, ISBN:0-9543481-0-9

Цитира се в:

15. Khameis A., Rashed S., Abou-Elhour A., Tarique M., ZigBee Optimal Scheduling System for Home Appliances in the United Emirates, J. Network Protokols and Algorithms, Vol 7(2), ISSN 1943-3581, 2015, 60 – 79., **@2015**

16. Nakbi, W., Alaya, I., & Zouari, W. (2015). A Hybrid Lagrangian Search Ant Colony Optimization Algorithm for the Multidimensional Knapsack Problem. Procedia Computer Science, 60, 1109-1119., **@2015**

12. Racheva M. R., **Andreev A. B.**. Superconvergence postprocessing for eigenvalues. Computational Methods in Applied Mathematics, 2, 3, De Gruyter, 2002, ISSN:1609-4840, DOI:10.2478/cmam-2002-0011, 171 - 185. SJR:0.653

Цитира се в:

17. Guo, Hailong. "Recovery Techniques For Finite Element Methods And Their Applications" (2015). Wayne State University Dissertations. Paper 1313, **@2015**

18. H. Xie, A Type of Multi-level Correction Scheme for Eigenvalue Problems by Nonconforming Finite Element Methods, BIT Numerical Mathematics, 2015, pp 1-24., **@2015**

19. X. Han, Y. Li, H. Xie, A Multilevel Correction Method for Steklov Eigenvalue Problem by Nonconforming Finite Element Methods, Numerical Mathematics: Theory, Methods and Applications / Volume 8 / Issue 03 / August 2015, pp 383-405., **@2015**

20. Qun Lin and Hehu Xie, A multi-level correction scheme for eigenvalue problems, Math. Comp. 84 (2015), 71-88., **@2015**

2003

13. **Fidanova S.**. ACO Algorithm for MKP Using Various Heuristic Information. Lecture Notes in Computer Science, 2542, Springer, 2003, ISSN:2300-5963, 434 - 440. SJR:0.339

Цитира се в:

21. Mavrovouniotis, M., and Yang, S., Applying ant colony optimization to dynamic binary-encoded problems, EvoApplications, Lecture Notes in Computer Science 9028, 2015, pp. 845 - 856 ., **@2015**

22. 20 Hammas, O., Ben Yahia, S., & Ben Ahmed, S., Adaptive web service composition insuring global QoS optimization. In Networks, Computers and Communications (ISNCC), 2015 International Symposium, 2015, pp.1-6., **@2015**

14. Alexandrov, V.N., **Dimov, I. T.**, **Karaivanova, A.**, Tan, Chih Jeng Kenneth. Parallel Monte Carlo algorithms for information retrieval. Mathematics and Computers in Simulation, 6, 3-6, Elsevier, 2003, ISSN:0378-4754, DOI:10.1016/S0378-4754(02)00252-5, 289 - 295. ISI IF:0.949

Цитира се в:

23. Zavadskas, E. K., Kaklauskas, A., & Banaitis, A. (2015). The use of the intelligent library and tutoring system at all stages of a building life cycle. Engineering Economics, 22(1)., **@2015**

24. Farnoosh, R., Aalaei, M., & Ebrahimi, M. (2015). Combined probabilistic algorithm for solving high dimensional problems. Stochastics An International Journal of Probability and Stochastic Processes, 87(1), 30-47., **@2015**

25. Farnoosh, R., & Aalaei, M. (2015). NEW ADAPTIVE MONTE CARLO ALGORITHM FOR PARALLEL SOLUTION OF LARGE LINEAR SYSTEMS WITH APPLICATIONS. PROCEEDINGS OF THE ROMANIAN ACADEMY SERIES A-MATHEMATICS PHYSICS TECHNICAL SCIENCES INFORMATION SCIENCE, 16(1), 11-19., **@2015**

2004

15. **Andreev A. B.**, Todorov T. D.. Isoparametric finite-element approximation of a Steklov eigenvalue problem. IMA Journal of Numerical Analysis, 24, 2, Oxford University Press, 2004, ISSN:02724979, DOI:10.1093/imanum/24.2.309, 309 - 322. SJR:1.616

Цитира се в:

26. AN Jing, An J. An efficient Legendre-Galerkin spectral approximation for the Steklov eigenvalue problem (in Chinese). Sci Sin Math, 2015, 45: 83–92, doi: 10.1360/012014-64, **@2015**

27. Xie, Hehu. "A type of multi-level correction scheme for eigenvalue problems by nonconforming finite element methods." BIT Numerical Mathematics (2015): 1-24., **@2015**

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2.1 Полза / ефект за обществото от извършваните дейности

Методите Монте Карло се смятат за най-надеждните методи за моделиране на електронен пренос в полупроводници. През последните години при моделирането на устройства се налагат толкова малки скали по отношение на пространството и времето, че протичащите процеси не биха могли да се разглеждат като полупроводников транспорт и затова е необходима квантова интерпретация.

Разработени бяха нови паралелни реализации на Датския Ойлеров модели за пренос на замърсители във въздушна среда. Чрез този модел могат да се определят източниците на дадени замърсители, както и да се предсказва при наличие на потенциални източници и съобразено с преобладаващите метеорологични условия. Проведени бяха поредица експерименти с адаптираната за съответния хардуер версия на Датския Ойлеров модел (UNI-DEM) върху високопроизводителния клъстър на IBM в Барселона – MareNostrum III. Числено решаване на такъв голям и сложен математически модел се основава на разцепването на изходната система от частни диференциални уравнения на няколко по-прости системи въз основа на основните физически и химически процеси, представени в нея чрез адитивни членове. Въз основа на модела UNI-DEM бе създадена специализираната версия за анализ на чувствителността на Датския Ойлеров модел (SA-DEM). Демонстрирана бе висока паралелната ефективност и скалируемост на алгоритъма, най-ясно проявена при най-фината дискретизационна мрежа на областта (480 x 480), при която се получават и най-детайлни резултати. **Това е от важно значение за практическото използване на модела, особено в по-малки по площ страни в Европа, включително и България.** Тези разработки са свързани с проект финансиран от фонда за научни изследвания с ръководител Иван Димов.

Разработвани са метаевристични и стохастични методи за оптимизационни задачи идващи от реалния живот и икономиката. Тези методи са прилагани към задачи за управление на ресурси което води до оптимално използване на налични ресурси при отчитане на ограничения;, оптимално управление на GPS мрежи и от там подобряване на предлаганата услуга; моделиране на биореактор за лекарствени субстанции, резултатите могат да се използват за оптимална настройка на работата на биореактор и от там за понижаване на цената на получените лекарствени субстанции; намиране контурите на изображения, този резултат може да се използва при обработка на изображения и едно от приложенията е рапознаване на образи с цел подобряване на сигурността. Приложен е интеркритериален анализ върху разработените алгоритми. Целта е намиране на степента на свързаност между отделните критерии при решаването на дадена задача и нейното опростяване без това да води до влошаване на получените резултати, а от там и повишаване на бързодействието при внедряване на съответните алгоритми. Тези разработки са свързани с два проекта финансирани от фонда за научни изследвания. Единият е с ръководител Иван Димов, а другият е с координатор за ИИКТ Любка Дуковска.

Разработен е модел за транспортиране на пътници с разнообразен транспорт (влак и автобус). Използвани са два основни критерия в модела: цена и време за транспортиране. Моделът показва колко пътници биха използвали влак и колко автобус. Той показва как се променя пътнико – потокът при промяна на разписанието на превозните средства както и при добавяне/премахване на превозно средство. Този модел може да бъде използван за оптимизиране на междуселищната транспортната мрежа по дадено направление. Тази разработка е свързана с проект финансиран от фонда за научни изследвания с ръководител Иван Димов.

2.2. Взаимоотношения с институции

Членовете на секцията са представили общо 11 рецензии и становища за присъждане на научни степени и звания и 126 рецензии за научни издания.

2.3. Практически дейности, свързани с работата на национални правителствени и държавни институции, индустрията, енергетиката, околната среда, селското стопанство, национални културни институции и др.

Опишете общонационални и оперативни дейности, извършвани във вашата секция, които обслужващи държавата (например НГИ, БИОМ и т.н.)

2.4. Проекти, свързани с общонационални и оперативни дейности, обслужващи държавата и обществото, финансирани от национални институции (без Фонд "Научни изследвания"), програми, националната индустрия и пр.

3. РЕЗУЛТАТИ ОТ НАУЧНАТА ДЕЙНОСТ ПРЕЗ 2015 г.:

3.1 Моля, опишете **ЕДНО най-важно и ярко научно постижение**,

МОНТЕ КАРЛО АЛГОРИТМИ С ЕФЕКТИВНА ПАРАЛЕЛНА РЕАЛИЗАЦИЯ

Разработени са фамилия Монте Карло алгоритми предназначени за решаване на задачи с голяма изчислителска сложност и много голяма размерност, водещи до плътни, разредени и структурирани матрици, както и тяхна ефективна паралелна реализация. Разработени са нови стохастични методи за приближено пресмятане на многоразмерни интеграли и интегрални уравнения. Създадените методи са оптимални по порядък и са много подходящи за задачи, свързани с моделиране на електронен пренос в полупроводници, създаване на фотореалистични изображения, за управление, оптимизация и вземане на решения и др.

Приложението на тези методи в изчислителната електроника и нано-физиката дава квантова интерпретация на процеса на електронен пренос в полупроводници, което е съществена стъпка за създаване на нови устройства за обработка на информация, базирани на квантови изчисления. Разработеният иновативен метод осигурява голямо количество подробности с използването на сравнително малки изчислителни ресурси.

Метаевристични методи от горната фамилия са приложени за решаване на задачи от икономиката (управление на ресурси), телекомуникации (GPS мрежи, маршрутизация), биология (моделиране на биореактор), транспорт (транспортиране на пътници с няколко вида транспортни средства) и др, като се акцентира върху конструирането на оптимален алгоритъм по отношение на времето за решаване и използването на компютърната памет.

Постигнатите резултати са публикувани в 16 в издания с импакт фактор (ИФ варира от 1.033 до 22.91), 9 в издания с SJR ранк и 6 публикации в реферирани сборници на престижни международни конференции.

Ръководител на колектива проф. Иван Димов

3.2 Моля, опишете **ЕДНО най-важно и ярко научно-приложно постижение.**

Разработен е нов Вигнеров-Монте Карло модел за транспорт на заредени частици, който има не само важни теоретични и приложни аспекти, но и сериозен иновативен потенциал. Моделът дава възможност за независима формулировка на квантовата механика в термините на частици във фазовото пространство и намира широко приложение в нано-електрониката (за симулация на поведението на приборите в съвременните интегрални схеми), в нано-структури (за симулация на електронни състояния в молекули), както и при създаване на нови принципи за обработка на информация.

Разработени са и метаевристични и стохастични методи за решаване на оптимизационни задачи, свързани с управление на ресурси при отчитане на ограничения; с оптимално управление на GPS с цел повишаване на качеството на услугата; с моделиране на

биореактор за производство на лекарствени субстанции с цел понижаване на цената на получените лекарства и др.

Постигнатите резултати са публикувани в 16 научни списания с импакт фактор Thomson Reuters (вариращ от 1.003 до 22.91), 9 в издания с SJR ранг на SCOPUS и 6 публикации в реферирани сборници на престижни международни конференции.
Ръководител на колектива: проф. Иван Димов

4. МЕЖДУНАРОДНО НАУЧНО СЪТРУДНИЧЕСТВО НА ЗВЕНОТО:

4.1 Организиране на международни конференции

Workshop on Combinatorial Optimization 2015 – Лодз, Полша седмият „**Workshop on Combinatorial Optimization**“ се проведе в рамките на FedCSIS'2014. Бяха изпратени над 35 статии, като 22 от тях бяха приети за докладване и включени в тома от конференцията. Участниците в конференцията бяха от 10 държави, както следва: Египет, Китай, Германия, Белгия, Франция, Италия, Полша, Словакия, Турция, Словения. Трудовете на конференцията са достъпни в IEEE Xplorer и имат импакт ранг. Разширени версии на приетите и изнесени доклади се публикуват в реномираната поредица Studies in Computational Inelligence на издателство Springer.

5. Участие на звеното в подготовката на специалисти: форми, сътрудничество с учебни заведения, външни заявители, включително от чужбина.

1. Стефка Фиданова, ERASMUS със Southampton Solent University
2. Стефка Фиданова, COST Action 1207 – делегат в управителния съвет