

# Curriculum Vitae

Andrew Martin Pownuk

## 1 Contact Information

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## 2 Education

- 2017 – Ph.D. degree in Computational Science, Computational Science Ph.D. Program, The University of Texas at El Paso, El Paso, Texas, USA. Dissertation title: Combining Interval and Probabilistic Uncertainty in Engineering Applications. Supervisor: Prof. Vladik Kreinovich.
- 2016 – Master’s degree in Computational Science, Computational Science Program, The University of Texas at El Paso, El Paso, Texas, USA. Thesis title: Combining Interval and Probabilistic Uncertainty in Engineering Applications. Supervisor: Prof. Vladik Kreinovich.
- 2014 – Master’s degree in Mathematics, Department of Mathematical Sciences, The University of Texas at El Paso, El Paso, Texas, USA. Thesis title: Fast Algorithm for Finding Lattice Subspaces in  $\mathbb{R}^n$  and its Implementation. Supervisor: Prof. Piotr Wojciechowski.
- 2001 – Ph.D. degree, Department of Civil Engineering, Silesian University of Technology in Gliwice, Poland. Dissertation title: Application of Fuzzy Sets Theory to Assessment of Reliability of Civil Engineering Structures. Supervisor: Prof. Jerzy Skrzypczyk.

- 1998 – Postgraduate Diploma (PGDip) in Computer Science, Department of Automatic Control, Electronics and Computer Science, Silesian University of Technology in Gliwice, Poland. Thesis title: Web Applications for Teaching of the Finite Element Method. Supervisor: Prof. Wojciech Mielczarek.
- 1995 – M.S./B.S. degree, Applied Mechanics, Department of Applied Mathematics, Silesian University of Technology, Gliwice, Poland. Diploma with honorable mention. Thesis title: Variational Equations in the Theory of Torsion of Prismatic Bars with Numerical Analysis. Supervisor: Prof. Szczepan Borkowski.

### 3 Work Experience

- 2010-Present – Lecturer, Department of Mathematical Sciences, The University of Texas at El Paso, USA.
- 2006-2010 – Assistant Professor, Department of Mathematical Sciences, The University of Texas at El Paso, USA.
- 2001-2006 – Assistant Professor, Institute of Theoretical Mechanics, Department of Civil Engineering, Silesian University of Technology in Gliwice, Poland.
- 2006 – Postdoctoral Position (Researcher), Bergen Language Design Laboratory (BLDL), Department of Computer Science, The University of Bergen, Bergen, Norway. Project: SAGA - Scientific Computing with Algebraic and Generative Abstractions. Supervisor: Prof. Magne Haver-aaen.
- 2003 – Postdoctoral Position (Researcher), Department of Mathematics, Faculty of Natural Sciences and Mathematics, University of Vienna, Vienna, Austria. COCONUT Project - COntinuous COntstraints - Updating the Technology. Supervisor: Prof. Arnold Neumaier.
- 2002 – Research Engineer, Chevron Corporation, San Ramon, California, USA.
- 1995-2001 – Lecturer and Ph.D. Student, Institute of Theoretical Mechanics, Department of Civil Engineering, Silesian University of Technology in Gliwice, Poland.

### 4 Education Additional

- Conference Board of the Mathematical Sciences (CBMS), Conference on Sparse Approximation and Signal Recovery Algorithms, Las Cruces, New Mexico, USA, May 22-26, 2017. Principal Lecturer, Anna C. Gilbert.

- 1999 (July) – Brno University of Technology, Czech Republic, Central European Exchange Program for University Studies (CEPUS). The stochastic finite element method and the theory of reliability.
- 1995-1999 – British Council, School of English Language.
- 1993-1995 – Course for teachers at the Research Center and Improvement of Didactics, Gliwice, Poland.
- 1994 (July-August) – Student Internship, CMG KOMAG, Mining Mechanization Center, Gliwice, Poland. Applications of the engineering software (PAFEC FEM) for the design of mining machines.

## 5 Awards

- 2018 – The University of Texas at El Paso Service Award for 10 years of service, El Paso, Texas, USA.
- 2017 – Academic and Research Excellence Graduate Student in Computational Science, the University of Texas at El Paso, El Paso, Texas, USA.
- 2014 – Academic and Research Excellence Graduate Student in Mathematics, the University of Texas at El Paso, El Paso, Texas, USA.
- 2013 – The University of Texas at El Paso Service Award for 5 years of service, El Paso, Texas, USA.
- 2000 – Award for Scientific Achievements, Silesian University of Technology, Gliwice, Poland.

## 6 Grants

- 2012 – Principal Investigator – Project for Chevron Oil Company in Houston, Texas.
- 2006 – Participant – Scientific Computing with Algebraic and Generative Abstractions. University of Bergen, Bergen, Norway.
- 2003-2004 – Participant – Continuous Constraints - Updating the Technology. Vienna University, Vienna, Austria.
- 1998-2001 – Participant – Interval and Qualitative Methods of Modeling Uncertainty in Physical Systems. Silesian University of Technology, Gliwice, Poland.
- 1996-1997 – Participant – Application of Boundary Element Method in Some Problems of Computational Mechanics. Silesian University of Technology, Gliwice, Poland.

## 7 Book Chapters

1. A. Pownuk, V. Kreinovich, and S. Sriboonchitta, Fuzzy Data Processing Beyond Min t-Norm, In: C. Berger-Vachon, A. Maria Gil Lafuente, J. Kacprzyk, Y. Kondratenko, J. M. Merigo Lindahl, and C. Morabito (eds.), *Complex Systems: Solutions and Challenges in Economics, Management, and Engineering*, Springer Verlag, to appear.
2. A. Pownuk and V. Kreinovich, (Hypothetical) negative probabilities can speed up uncertainty propagation algorithms, In: A. E. Hassanien, M. Elhoseny, A. Farouk, and J. Kacprzyk (eds.), *Quantum Computing: an Environment for Intelligent Large Scale Real Application*, Springer Verlag, to appear.
3. V. Kreinovich, A. Pownuk, and O. Kosheleva, Combining interval and probabilistic uncertainty: What is computable?, in: P. Pardalos, A. Zhigljavsky, and J. Zilinskas (eds.), *Advances in Stochastic and Deterministic Global Optimization*, Springer Verlag, Cham, Switzerland, 13-32, 2016.
4. M. Ceberio, V. Kreinovich, A. Pownuk, and B. Bede, From interval computations to constraint-related set computations: towards faster estimation of statistics and ODEs under interval, p-box, and fuzzy uncertainty, in: JingTao Yao (ed.), *Novel Developments in Granular Computing: Applications for Advanced Human Reasoning and Soft Computation*, IGI Global, 131-147, 2010.
5. A. Pownuk, Numerical solutions of fuzzy partial differential equation and its application in computational mechanics, in: M. Nikraves, L. Zadeh and V. Korotkikh, (eds.), *Fuzzy Partial Differential Equations and Relational Equations: Reservoir Characterization and Modeling*, Physica-Verlag, 308-347, 2004.

## 8 Textbook

1. J. Jedrzejczyk-Kubik, A. Pownuk, and J. Skrzypczyk, *Selected Mathematical Problems with Exercises* (in Polish), Publishing House of the Silesian University of Technology, ISBN 978-83-7335-578-1, Gliwice, Poland, 2010.

## 9 Journal Papers

1. A. Pownuk and V. Kreinovich, Towards Decision Making under Interval Uncertainty, *Journal of Uncertain Systems*, to appear.
2. A. Pownuk, O. Kosheleva, and V. Kreinovich, Towards Decision Making under General Uncertainty, *Mathematical Structures and Modeling*, 44, 2017, to appear.

3. A. Pownuk and V. Kreinovich, Why linear interpolation?, *Mathematical Structures and Modeling*, 43, 43–49, 2017.
4. A. Pownuk and V. Kreinovich, Why Mixture of Probability Distributions?, *International Journal of Intelligent Technologies and Applied Statistics (IJITAS)*, 10(2), 41-45, 2017.
5. V. Kreinovich, O. Kosheleva, A. Pownuk, and R. Romero, How to take into account model inaccuracy when estimating the uncertainty of the result of data processing, *ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part B: Mechanical Engineering*, 3(1), Paper No. 011002, 2017.
6. A. Pownuk, P. Barragan Olague, and V. Kreinovich, Why Compaction Meter Value (CMV) Is a Good Measure of Pavement Stiffness: Towards a Possible Theoretical Explanation, *Mathematical Structures and Modeling*, 40, 48-54, 2016.
7. A. Pownuk, L. Longpre, and V. Kreinovich, Checking monotonicity is NP-Hard even for cubic polynomials, *Reliable Computing*, 18, 90-96, 2013.
8. M.V. Rama Rao, A. Pownuk, M. De Munck, and D. Moens, Fuzzy analysis of the moment of resistance of a doubly reinforced concrete beam with uncertain structural parameters, *Life Cycle Reliability and Safety Engineering*, 2(1), 9-20, 2013.
9. M.V. Rama Rao, A. Pownuk, S. Vandewalle, and D. Moens, Transient response of structures with uncertain structural parameters. *Journal of Structural Safety*, 32(6), 449-460, 2010.
10. A. Pownuk, N. Kumar, and G. Ramunigari, Application of order-preserving functions to the modeling of computational mechanics problems with uncertainty, *Reliable Computing*, 15, 132-143, 2011.
11. A. Pownuk, Mathematical aspects of grading student’s homework in online web applications, *Journal of Uncertain Systems*, 5(2), 141-153, 2011.
12. M. V. Rama Rao, A. Pownuk, and I. Skalna, Stress analysis of a singly reinforced concrete beam with uncertain structural parameters, *International Journal of Reliability and Safety*, 3(1/2/3), 307-329, 2009.
13. I. Skalna and A. Pownuk, Global optimization method for computing interval hull solution for parametric linear systems, *International Journal of Reliability and Safety*, 3(1/2/3), 235-245, 2009.
14. I. Skalna, M.V. Rama Rao, and A. Pownuk, Systems of fuzzy equations in structural mechanics, *Journal of Computational and Applied Mathematics*, 218(1), 149-156, 2008.

15. A. Neumaier and A. Pownuk, Linear Systems with Large Uncertainties, with Applications to Truss Structures, *Journal of Reliable Computing*, 13(2), 149-172, 2007.
16. A. Pownuk, Optimization of mechanical structures using interval analysis, *Computer Assisted Mechanics and Engineering Sciences*, 7(4), 699-705, 2000.
17. M. Jasinski and A. Pownuk, Modeling of heat transfer in biological tissue by interval FEM, *Computer Assisted Mechanics and Engineering Sciences*, 7(4), 551-558, 2000.
18. A. Pownuk, Interval methods for solution of nonlinear equations of structural mechanics (in Polish), *Research Bulletin of the Institute of Applied Mechanics*, 9, Silesian University of Technology, Gliwice, Poland, 321-236, 1999.
19. A. Pownuk, Modeling of uncertain parameters in mechanical structures by using the Interval Mathematics (in Polish), *Research Bulletin of the Institute of Applied Mechanics*, 9, Silesian University of Technology, Gliwice, Poland, 225-230, 1999.
20. A. Pownuk, Application of regular interval Jacobian matrices for calculation of extreme value of mechanical quantities. Part I - theoretical foundations (in Polish), *Scientific Bulletin of the Silesian University of Technology, Civil Engineering Series*, 86, 167-174, 1999.
21. A. Pownuk, Application of regular interval Jacobian matrices for calculation of extreme value of mechanical quantities. Part II - numerical examples (in Polish), *Scientific Bulletin of the Silesian University of Technology, Civil Engineering Series*, 86, 175-182, 1999.
22. Z. Kulpa, A. Pownuk, and I. Skalna, Analysis of linear mechanical structures with uncertainties by means of interval methods, *Computer Assisted Mechanics and Engineering Sciences*, 5, 443-477, 1998.
23. A. Pownuk, Interval methods for solution of the equation of structural mechanics (in Polish), *Scientific Bulletin of the Silesian University of Technology, Civil Engineering Series*, 85, 61-74, 1998.
24. J. Skrzypczyk and A. Pownuk, On some method of estimation of upper value of mechanical quantities under interval uncertainty (in Polish), *Scientific Bulletin of the Institute of Applied Mechanics*, 7, Silesian University of Technology, Gliwice, Poland, 323-328, 1998.
25. J. Skrzypczyk and A. Pownuk, Methods for solution of the interval system of equations in the fuzzy mechanics (in Polish), *Scientific Bulletin of the Institute of Applied Mechanics*, 4, Silesian University of Technology, Gliwice, Poland, 323-328, 1997.

## 10 Papers in Conference Proceedings

1. A. Pownuk and V. Kreinovich, Why Unexpectedly Positive Experiences Make Decision Makers More Optimistic: An Explanation, *Proceedings of the 10th International Workshop on Constraint Programming and Decision Making CoProd'2017*, El Paso, Texas, November 3, 2017, pp. 33-37.
2. A. Pownuk and V. Kreinovich, Which Value  $\tilde{x}$  Best Represents a Sample  $x_1, \dots, x_n$ : Utility-Based Approach Under Interval Uncertainty, *Proceedings of the 10th International Workshop on Constraint Programming and Decision Making CoProd'2017*, El Paso, Texas, November 3, 2017, pp. 43-47.
3. P. Melin, O. Castillo, A. Pownuk, O. Kosheleva, and V. Kreinovich, How to Gauge the Accuracy of Fuzzy Control Recommendations: A Simple Idea, *Proceedings of the 2017 Annual Conference of the North American Fuzzy Information Processing Society NAFIPS'2017*, Cancun, Mexico, October 16-18, 2017.
4. S. Kumkov, V. Kreinovich, and A. Pownuk, In System Identification, Interval (and Fuzzy) Estimates Can Lead to Much Better Accuracy than the Traditional Statistical Ones: General Algorithm and Case Study, *Proceedings of the IEEE Conference on Systems, Man, and Cybernetics SMC'2017*, Banff, Canada, October 5-8, 2017.
5. L. Dymova, P. Sevastjanov, A. Pownuk, and V. Kreinovich, Practical Need for Algebraic (Equality-Type) Solutions of Interval Equations and for Extended-Zero Solutions, *Proceedings of the 12th International Conference on Parallel Processing and Applied Mathematics PPAM'17*, Lublin, Poland, September 10-13, 2017.
6. B. J. Kubica, A. Pownuk, and V. Kreinovich, What Decision to Make In a Conflict Situation under Interval Uncertainty: Efficient Algorithms for the Hurwicz Approach, *Proceedings of the 12th International Conference on Parallel Processing and Applied Mathematics PPAM'17*, Lublin, Poland, September 10-13, 2017.
7. A. Pownuk and V. Kreinovich, Isn't Every Sufficiently Complex Logic Multi-Valued Already: Lindenbaum-Tarski Algebra and Fuzzy logic Are Both Particular Cases of the Same Idea, *Proceedings of the Joint 17th Congress of International Fuzzy Systems Association and 9th International Conference on Soft Computing and Intelligent Systems*, Otsu, Japan, June 27-30, 2017.
8. A. Pownuk and V. Kreinovich, Which point from an interval should we choose?, *Proceedings of the 2016 Annual Conference of the North American Fuzzy Information Processing Society NAFIPS'2016*, El Paso, Texas, October 31 - November 4, 2016.

9. A. Pownuk, O. Kosheleva, and V. Kreinovich, Limitations of realistic Monte-Carlo techniques in estimating interval uncertainty, *Proceedings of the 7th International Workshop on Reliable Engineering Computing REC'2016*, Bochum, Germany, 269-284, June 15-17, 2016.
10. V. Kreinovich, O. Kosheleva, A. Pownuk, and R. Romero, How to take into account model inaccuracy when estimating the uncertainty of the result of data processing, *Proceedings of the ASME 2015 International Mechanical Engineering Congress & Exposition IMECE'2015*, Houston, Texas, November 13-19, 2015.
11. C.D. Stylios, A. Pownuk, and V. Kreinovich, Sometimes, it is beneficial to process different types of uncertainty separately, *Proceedings of the Annual Conference of the North American Fuzzy Information Processing Society NAFIPS'2015 and 5th World Conference on Soft Computing*, Redmond, Washington, August 17-19, 2015.
12. I. Skalna, M.V. Rama Rao, and A. Pownuk, Dynamic response of beams to interval load, *5th International Conference on Reliable Engineering Computing*, Brno University of Technology, Brno, Czech Republic, June 13-15, 2012.
13. A. Pownuk, Solution of the interval equations of dynamics by using adaptive approximation, *Proceedings of the Annual Conference of the North American Fuzzy Information Processing Society NAFIPS'2011*, El Paso, Texas, March 18-20, 2011.
14. I. Skalna and A. Pownuk, Applications of the global optimization methods for the solution of truss structures with interval parameters, *Proceedings of the Workshop on Global Optimization*, Toulouse, France, August 31-September 3, 2010.
15. A. Pownuk, B. Djafari-Rouhani, and N.K. Goud Ramunigari, Finite Element Method with the interval set parameters and its applications in computational science, *Proceedings of the American Conference on Applied Mathematics*, Harvard University, Cambridge, ISBN: 978-960-474-150-2, ISSN: 1790-2769, 310-315, January 27-29, 2010.
16. A. Pownuk and N.K. Goud Ramunigari, Design of 2D elastic structures with the interval parameters, *Proceedings of the 11th WSEAS Int. Mathematical and Computational Methods in Science and Engineering*, Baltimore, MD. ISBN 978-960-474-133-5, 25-29, November 7-9, 2009.
17. A. Pownuk, J. Cervený, and J.J. Brady, Fast algorithms for uncertainty propagation, and their applications to structural integrity, *Proceedings of the Annual Conference of the North American Fuzzy Information Processing Society NAFIPS'2008*, New York, NY, Paper number 60510, May 19-22, 2008.



18. M.V. Rama Rao and A. Pownuk, Design of truss and frame structures with interval and fuzzy parameters, *Proceedings of the Annual Conference of the North American Fuzzy Information Processing Society NAFIPS'2008*, New York, New York, Paper number 60511, May 19-22, 2008.
19. A. Pownuk, General interval FEM program based on sensitivity analysis, *Proceedings of the NSF Workshop on Reliable Engineering Computing*, Savannah, Georgia, 397-428, February 20-22, 2008.
20. M.V. Rama Rao, A. Pownuk, and I. Skalna, Stress analysis of a singly reinforced concrete beam with uncertain structural parameters, *Proceedings of the NSF Workshop on Reliable Engineering Computing*, Savannah, Georgia, 459-478, February 20-22, 2008.
21. I. Skalna and A. Pownuk, On using global optimization method for approximating interval hull solution of parametric linear systems, *Proceedings of the NSF workshop on Reliable Engineering Computing*, Savannah, Georgia, February 20-22, 81-89, 2008.
22. M.V. Rama Rao and A. Pownuk, Stress distribution in a reinforced concrete flexural member with uncertain structural parameters, *Proceedings of the International Conference on Recent Developments in Structural Engineering*, Manipal Institute of Technology, Manipal, India, August 30 - September 1, 138-148, 2007.
23. G. Xiang, A. Pownuk, S.A. Starks, and O. Kosheleva, Von Mises failure criterion for ductile materials: how to efficiently use it under interval and fuzzy uncertainty, *Proceedings of the Annual Conference of the North American Fuzzy Information Processing Society NAFIPS'2007*, San Diego, California, 570-575, June 24-27, 2007.
24. M. Ceberio, V. Kreinovich, A. Pownuk, and B. Bede, From interval computations to constraint-related set computations: towards faster estimation of statistics and ODEs under interval, p-Box, and fuzzy uncertainty, *Proceedings of the Conference IFSA (International Fuzzy Systems Association)*, Cancun, Mexico, 33-42, June 24-27, 2007.
25. M. Betkowski and A. Pownuk, Analysis of the financial risk of the civil engineering projects with uncertain data (in Polish), *Proceedings of the VII International Scientific Conference, Risk 2005*, ISBN 83-915990-5-1, 349-356, Bydgoszcz, Poland, 23-25 October, 2005.
26. M. Betkowski and A. Pownuk, Application of fuzzy arithmetic for analysis of the risk of civil engineering projects (in Polish), *Proceedings of the VII International Scientific Conference, Risk 2005*, ISBN 83-915990-5-1, 221-228, Bydgoszcz, Poland, 23-25 October, 2005.
27. M. Betkowski and A. Pownuk, Estimation of the financial risk by using the random variables with the fuzzy parameters and the BPFPRAL language

- (in Polish), *Proceedings of the VII International Scientific Conference, Risk 2005*, 33-38, ISBN 83-915990-5-1, Bydgoszcz, Poland, 23-25 October, 2005.
28. M. Betkowski and A. Pownuk, Calculating risk of cost using Monte Carlo simulation with fuzzy parameters in civil engineering, *Proceeding of the NSF Workshop on Reliable Engineering Computing*, Savannah, Georgia, USA, 179-192, September 15-17, 2004.
  29. A. Pownuk, Efficient method of solution of large scale engineering problems with interval parameters based on sensitivity analysis, *Proceeding of the NSF Workshop on Reliable Engineering Computing*, Savannah, Georgia, USA, 305-316, September 15-17, 2004.
  30. A. Pownuk, Calculation of reliability of structures using random sets, *Proceeding of the Symposium on Methods of Artificial Intelligence in Mechanics and Mechanical Engineering*, AI-MECH 2001, Gliwice, Poland, 217-220, November 14-16, 2001.
  31. A. Pownuk, Reliability of structures with interval and random parameters (in Polish), *Proceedings of the II Session of Ph.D. Students of the Department of Civil Engineering*, Gliwice, Wisla, Poland, 120-125, 23-24 November, 2001.
  32. A. Pownuk, Application of the sensitivity analysis for modeling of structures with the interval parameters (in Polish), *Proceedings of the XLVI Conference of the Civil Engineering Committee PAS and Science Committee PZiTb, Krynica'2000*, 1, 145-152, 2000.
  33. A. Pownuk, Hybrid interval method for global optimization of engineering structures, *Proceeding of the III. slovensko - polsko - czeske symposium "Nelinearna Mechanika"*, Faculty of Civil Engineering STU, Slovakia, Bratislava, 125-129, 2000.
  34. A. Pownuk, Modeling of mechanical structures with uncertain parameters (in Polish), *Proceeding of the Workshop "Symulacja 2000"*, Szczyrk, Poland, 2000.
  35. A. Pownuk, Calculation of reliability of structures by using interval probability, *Proceeding of the Symposium on Methods of Artificial Intelligence in Mechanics and Mechanical Engineering*, AI-MECH 2000, Gliwice, Poland, 273-276, 2000.
  36. A. Pownuk, Hybrid interval and gradient method for optimization of engineering structures (in Polish), *Proceedings of the I Scientific of Civil Engineering Ph.D. students from the Silesian University of Technology, Scientific Bulletin of the Silesian University of Technology, Civil Engineering Series*, 89, 179-186, Gliwice, Poland, 6 December, 2000.

37. A. Pownuk, Interval methods for solution of the equations of dynamics of structures (in Polish), *Proceedings of the X Symposium Dynamics of Structures*, Rzeszow, Poland, 77-84, 25-26 May 1999.
38. E. Majchrzak, M. Jasinski, and A. Pownuk, Modeling of heat transfer in biological tissue by interval Boundary Element Method (in Polish), *Proceedings of the IV Scientific Conference "Biomechanics'99"*, 305-308, 8-11 October, 1999.
39. A. Pownuk, Interval method for optimization of engineering structures (in Polish), *Proceedings of the XLV Conference of the Civil Engineering Committee PAS and Science Committee PZiTb, Krynica'99*, 135-142, 13-18 September, 1999.
40. A. Pownuk, Application of interval global optimization to calculation extreme values of mechanical quantities, *Proceedings of the 20 International Scientific Symposium for Students and Young Scientists*, Zielona Gora, Poland, Vol. IV "Mechanics", 211-215, 1998.
41. A. Pownuk, Interval methods for solution of nonlinear algebraic equations in the mechanics of structures (in Polish), *Proceedings of the XLIV Conference of the Civil Engineering Committee PAS and Science Committee PZiTb, Krynica'1998*, Vol. 1, 187-194, 1998.
42. J. Skrzypczyk, A. Pownuk, and G. Nowak, Applications of the theory of fuzzy sets in calculations the theory of strength of materials (in Polish), *Proceedings of the Scientific Conference in Occasion of the 70'th Birthday of Prof. Glomb*, Gliwice, Poland, 253-262, 1997.
43. A. Pownuk, Interval methods for solution of system of linear equations of solid mechanics (in Polish), *Proceedings of the Scientific and Educational Conference New Trends in Teaching of Mechanics*, Kolobrzeg, Poland, 219-228, 1997.
44. J. Skrzypczyk and A. Pownuk, Fuzzy Finite Element Method (in Polish), *Proceedings of the Scientific and Educational Conference New Trends in Teaching of Mechanics*, Kolobrzeg, 175-184, 1997.

## 11 Published Abstracts

1. V. Kreinovich, A. M. Pownuk, O. M. Kosheleva, and A. Belina, When is Propagation of Interval and Fuzzy Uncertainty Feasible? *Abstracts of the 8th International Workshop on Reliable Engineering Computing*, July 16-18, 2018, University of Liverpool, UK.
2. A. Pownuk, J. Quezada, I. Skalna, M. V. Rama Rao, and A. Belina, Which Method for Solution of the System of Interval Equations Should

- we Choose? *Abstracts of the 21th Joint UTEP/NMSU Workshop on Mathematics, Computer Science, and Computational Sciences*, El Paso, Texas, November 4, 2017.
3. A. Pownuk and J. Quezada, A Posteriori Error Bounds for Two Point Boundary Value Problem with Uncertain Parameters, *Abstracts of the 20th Sixteenth New Mexico Analysis Seminar, Department of Mathematical Sciences*, New Mexico State University, Las Cruces, May 21, 2017.
  4. A. Pownuk, I. Skalna, and J. Quezada, Solution of the Wave Equation with Interval and Random Parameters, *Abstracts of the 20th Joint NMSU/UTEP Workshop on Mathematics, Computer Science, and Computational Sciences*, Las Cruces, New Mexico, April 8, 2017.
  5. A. Pownuk and V. Kreinovich, Why Linear Interpolation?, *Abstracts of the 20th Joint NMSU/UTEP Workshop on Mathematics, Computer Science, and Computational Sciences*, Las Cruces, New Mexic, April 8, 2017.
  6. A. Pownuk, Combining Interval and Probabilistic Uncertainty in Engineering Applications, *Abstracts of the 19th Joint UTEP/NMSU Workshop on Mathematics, Computer Science, and Computational Sciences*, El Paso, Texas, November 5, 2016.
  7. A. Pownuk, Approximate method for computing the sum of independent random variables, *Abstracts of the 17th Joint UTEP/NMSU Workshop on Mathematics, Computer Science, and Computational Sciences*, El Paso, Texas, November 7, 2015.
  8. A. Pownuk, Fast algorithm for finding lattice subspaces in  $R^n$  and its implementation, *Abstracts of the 16th Joint NMSU/UTEP Workshop on Mathematics, Computer Science, and Computational Sciences*, Las Cruces, Texas, April 11, 2015.
  9. A. Pownuk, I. Skalna, and N. K. Goud Ramunigari, Parallel methods for solution of equations with uncertain parameters, *Abstracts of the 12th Joint UTEP/NMSU Workshop on Mathematics, Computer Science, and Computational Sciences*, El Paso, Texas, Saturday, October 27, 2012.
  10. A. Pownuk, Linear dynamics of an elastic beam and plate under moving loads with uncertain parameters, *Abstracts of the 10th Joint UTEP/NMSU Workshop on Mathematics, Computer Science, and Computational Sciences*, El Paso, Texas, Saturday, November 5, 2011.
  11. A. Pownuk, Finite difference equations with the interval parameters, *Abstracts of the 9th Joint NMSU/UTEP Workshop on Mathematics, Computer Science, and Computational Sciences*, Las Cruces, April 2nd, 2011.
  12. A. Pownuk, Finite difference equations with the interval parameters, *Constraint Programming and Decision Making*, El Paso, Texas, March 17, 2011.

13. A. Pownuk, J.I. Alonso, R.A. Casillas Pacheco, A. Chavez, D. Canales, S. Edmundo, and R.W. Arriaga, On-line applications in science and education, *Abstracts of the 8th Joint UTEP/NMSU Workshop on Mathematics, Computer Science, and Computational Sciences*. El Paso, Texas, November 13, 2010.
14. M.V. Rama Rao, A. Pownuk, and S. Vandewalle, A fuzzy finite element approach to computing the uncertain dynamic response of a simply-supported thin rectangular plate subjected to an impact load. *Abstracts of the International Congress on Computational and Applied Mathematics*, Leuven, Belgium, July 05-09, 2010.
15. A. Pownuk and M. Betkowski, Calculating risk of cost in civil engineering projects by using imprecise probability and HPC computing, *Abstracts of the American Mathematical Society Meetings*, Albuquerque, New Mexico, Meeting 1059, April 17-18, 2010.
16. A. Pownuk, Adaptive Taylor series and its applications in the Interval Finite Element Method, *Abstracts of the 7th Joint NMSU/UTEP Workshop on Mathematics, Computer Science, and Computational Sciences*, Las Cruces, New Mexico, April 3, 2010.
17. R. Azizi and A. Pownuk, Parallel method for the solution of stochastic differential equations with the interval parameters, *Abstracts of the 7th Joint NMSU/UTEP Workshop on Mathematics, Computer Science, and Computational Sciences*, Las Cruces, New Mexico, April 3, 2010.
18. R. Casillas and A. Pownuk, Parallel web computing, *Abstracts of the Southwestern Undergraduate Mathematics Research Conference*, The University of Texas at El Paso, Texas, March 5-6, 2010.
19. D. Canales and A. Pownuk, Applications of parallel computing to the solution of equations with the random parameters, *Abstracts of the Southwestern Undergraduate Mathematics Research Conference*, The University of Texas at El Paso, Texas, March 5-6, 2010.
20. A. Pownuk, Online Homework Assignments and Visualizations in Modern Teaching of Numerical Analysis, *Abstracts of the Sun Conference on Teaching and Learning*, March 4-5, 2010, The University of Texas at El Paso, Texas, USA.
21. J. Alonso and A. Pownuk, System of equations with random set parameters, *Abstracts of the Southwestern Undergraduate Mathematics Research Conference*, The University of Texas at El Paso, Texas, March 5-6, 2010.
22. A. Pownuk, Online homework assignments and visualizations in modern teaching of numerical analysis, *Abstracts of the Sun Conference on Teaching and Learning*, The University of Texas at El Paso, Texas, March 4-5, 2010.

23. M. Ceberio, V. Kreinovich, and A. Pownuk, Constraints-related set computations: a new fem-motivated approach to propagating uncertainty, *Abstracts of the Second International Conference on Finite Element Methods in Engineering and Science*, Reno, Nevada, Dec. 2009.
24. A. Pownuk, M.A. Jankowska, and N. K. Ramunigari, Applications of higher order monotonicity tests to the solution of equations with the interval parameters, *Abstracts of the Co Constraint Solving Workshop*, El Paso, Texas, November 9-10, 2009.
25. A. Pownuk, Calculating risk of cost in civil engineering projects by using imprecise probability and the theory of soft sets, *Abstracts of the 6th Joint UTEP/NMSU Workshop on Mathematics, Computer Science, and Computational Sciences*, El Paso, Texas, November 7, 2009.
26. A. Pownuk and M. Ortiz, Topological derivative and its applications to the modeling of uncertainty and optimization, *Abstracts of the 5th Joint NMSU/UTEP Workshop on Mathematics, Computer Science, and Computational Sciences*. Las Cruces, New Mexico, April 4th, 2009.
27. A. Pownuk, Mathematical aspects of grading students' homework in on-line web applications, *Abstracts of the 4th Joint UTEP/NMSU Workshop on Mathematics, Computer Science, and Computational Sciences*, El Paso, Texas, November 8, 2008.
28. M. Ceberio, V. Kreinovich, and A. Pownuk, From interval computations to constraint-related set computations: towards faster estimation of statistics and ODEs under interval and p-box uncertainty constraint programming and decision making, *Abstracts of the Workshop Constraint Programming and Decision Making*, El Paso, Texas, October 3-4, 2008.
29. M.V. Rama Rao, A. Pownuk, and D. Moens, Stress analysis of a doubly reinforced concrete beam with uncertain structural parameters, *Abstracts of the 13th GAMM - IMACS International Symposium on Scientific Computing, Computer Arithmetic, and Verified Numerical Computations*, El Paso, TX, September 29 - October 3, 2008.
30. M.V. Rama Rao, A. Pownuk, and R.L Muhanna, Modeling of failure surface of a reinforced concrete slab with fuzzy loading - an interval approach, *Abstracts of the 13th GAMM - IMACS International Symposium on Scientific Computing, Computer Arithmetic, and Verified Numerical Computations*, El Paso, Texas, USA, September 29 - October 3, 2008.
31. A. Pownuk and N.K. Goud Ramunigari, Application of order-preserving functions to the modelling of computational mechanics problems with uncertainty, *Abstracts of the 13th GAMM - IMACS International Symposium on Scientific Computing, Computer Arithmetic, and Verified Numerical Computations*, El Paso, Texas, September 29 - October 3, 2008.

32. A. Pownuk and A. Rivera, Sensitivity analysis of truss and frame structures with uncertain geometry, *Abstracts of the 3rd Joint NMSU/UTEP Workshop on Mathematics and Computer Science, New Mexico State University, Las Cruces, New Mexico, April 26, 2008.*
33. A. Pownuk, General Interval FEM Program Based on Sensitivity Analysis Method, *Abstracts of the 2nd Joint UTEP/NMSU Workshop on Mathematics and Computer Science, El Paso, Texas, November 17, 2007.*
34. A. Pownuk, Numerical solution of FEM equations with uncertain functional parameters, *Abstracts of the Conference FEMTEC*, El Paso, TX, December 11-15, 2006.
35. I. Skalna, M.V. Rama Rao, and A. Pownuk, Systems of fuzzy equations in structural mechanics, *Abstracts of the FEMTEC*, El Paso, TX, December 11-15, 2006.
36. M. Betkowski and A. Pownuk, Applications of the fuzzy algebra for predicting of the financial risk in civil engineering projects (in Polish), *Abstracts of the Scientific Conference "Polish Civil Engineering One Year After Accession of Poland to the European Union"*, Gdansk, Poland, 9-11 June, 2005.
37. M. Betkowski and A. Pownuk, Concept of the random variable with fuzzy parameters and their applications for estimation of the financial risk of civil engineering projects (in Polish), *Abstracts of the Scientific Conference "Polish Civil Engineering One Year After Accession of Poland to the European Union"*, Gdansk, Poland, 9-11 June, 2005.
38. M. Betkowski and A. Pownuk, Estimation of the financial risk of civil engineering project by using fuzzy random variables and Monte Carlo Simulations (in Polish), *Abstracts of the Scientific Conference "Polish Civil Engineering One Year After Accession of Poland to the European Union"*, Gdansk, Poland, 9-11 June, 2005.
39. A. Pownuk, Worst case finite element computations, Abstracts of the COCONUT meeting, University of Vienna, Vienna, Austria, 14-16 April, 2003.
40. A. Pownuk, Numerical solutions of fuzzy partial differential equations and its application in computational mechanics, *Abstracts of the Workshop on Assessment and New Directions for Research, Fuzzy Partial Differential Equations, Fuzzy Relational Equations, Fuzzy Difference Equations*. BISC Program, University of California-Berkeley, California, USA, March 15-17, 2002.
41. A. Pownuk, Modeling of structures with taking into account uncertainty of the parameters. *Abstracts of the XLI Symposium Modeling in Mechanics*, Poland, 2002.

42. A. Pownuk, Reliability of structures with fuzzy parameters (in Polish). *Abstracts of the XL Symposium Modeling in Mechanics*, Poland, 205-206, 19-23 February, 2001.
43. A. Pownuk, New inclusion functions in the interval global optimization (in Polish), *Abstracts of the XL Symposium Modeling in Mechanics*, Poland, 207-208, 19-23 February, 2001.
44. A. Pownuk, New inclusion functions in interval global optimization of engineering structures, *Abstracts of the European Conference on Computational Mechanics*, Cracow, 460-461, 26-29 June, 2001.
45. A. Pownuk, Design of systems with uncertain parameters (in Polish), *Abstracts of the Symposium Durability of Structures, Kamien Slaski, Poland*, 14-15, 2-3 July, 2001.
46. A. Pownuk, Applications of regular interval Jacobian matrices for modeling of mechanical structures with the interval parameters (in Polish), *Abstracts of the XXXIX Symposium Modeling in Mechanics*, Wisla, Poland, 269-270, 2000.
47. A. Pownuk, Calculation of reliability of structures using fuzzy sets theory, *Abstracts of the 32nd Symposium on Mathematical Physics with special session "Symmetries in Nonlinear Systems"*, Torun, Poland, June 6-10, 2000.
48. A. Pownuk, Calculation of displacement in elastic and elastic-plastic structures with interval parameters, *Abstracts of the 33rd Solid Mechanics Conference (SolMech2000)*, Zakopane, Poland, 160-161, 5-9 September, 2000.
49. A. Pownuk, Applications of sensitivity analysis for modeling of structures with uncertain parameters, *Abstracts of the International Conference on Interval Methods in Science and Engineering "Interval'2000"*, Karlsruhe, Germany, 116-117, 2000.
50. M. Jasinski and A. Pownuk, Modeling of Heat Transfer in Biological Tissue by Interval FEM, *Abstracts of the 14th Polish Conference on Computer Methods in Mechanics (PCCMM'99)*, Rzeszow, Poland, 127-128, May 26-29, 1999.
51. A. Pownuk, Optimization of Mechanical Structures using Interval Analysis, *14th Polish Conference on Computer Methods in Mechanics (PCCMM'99)*, Rzeszow, Poland, May 26-29, 301-302, 1999.
52. A. Pownuk, Applications of Regular Interval Jacobian Matrices to Calculation Extreme Values of Mechanical Quantities, *Abstracts of the Workshop Reliable Computations and Interval Algebra*, Sozopol, Bulgaria, September 27-29, 1999.



## 12 Invited Talks

1. Automated solution of equations with uncertain parameters. University of Nevada, Reno, Nevada, USA, 04/12/2012.
2. Modeling of Uncertainty in Computational Mechanics, Presentation for REU Summer Site in Applied Intelligent Systems, The University of Texas at El Paso, El Paso, Texas, USA, 07/02/2010.
3. Modeling of Uncertainty in Computational Mechanics, Presentation for Computational Science Ph.D. students, The University of Texas at El Paso, El Paso, Texas, USA, 04/22/2010.
4. Overview of the Methods of Solution for the Equations with the Interval Parameters and its Applications in Structural Mechanics. The University of Texas at El Paso, El Paso, Texas, USA, 09/11/2009.
5. General Interval FEM Program Based on Sensitivity Analysis Method, The University of Texas at El Paso, El Paso, Texas, USA, 09/07/2007.
6. Coordinate free numerics. The University of Texas at El Paso, El Paso, Texas, USA, 08/09/2006.
7. Mathematical modeling of uncertainty in computational mechanics. The University of Texas at El Paso, El Paso, Texas, USA, 07/03/2006.
8. Mathematical basis of the design of structures with uncertain parameters. University of Vienna, Vienna, Austria, 10/03/2003.
9. Applications of the theory of fuzzy sets for estimation of reliability of civil engineering structures (in Polish), Institute of Fundamental Technological Research Polish Academy of Sciences, Warsaw, Poland, 05/10/2001.
10. Applications of Interval Analysis in Mechanics. Brno University of Technology, Brno, Czech Republic, 20/07/1999.
11. Applications of the interval global optimization for estimation of extreme values of mechanical quantities (in Polish), Institute of Fundamental Technological Research Polish Academy of Sciences, Warsaw, Poland, 12/04/1997.
12. Methods for solutions of the system of interval equations and their applications in mechanics (in Polish), Institute of Fundamental Technological Research Polish Academy of Sciences, Warsaw, Poland, 01/23/1997.

## 13 Thesis Supervising

1. Kiran Katta, PhD. dissertation, Computational Science Ph.D. Program, dissertation defense 07/23/2012, member of the Ph.D. committee.

2. Luis Basurto, PhD. dissertation, Computational Science Ph.D. Program, dissertation defense 12/20/2012, member of the Ph.D. committee.
3. Marco Olguin, PhD. dissertation, Computational Science Ph.D. Program, dissertation defense 12/20/2012, member of the Ph.D. committee.
4. Brenda Medina, Master's thesis, Mathematics, thesis defense 12/07/2011, chair of the committee.
5. Kiran Katta, Master's thesis, Computational Science Program, thesis defense 06/10/2011, member of the committee.

## 14 Undergraduate Student Contracts

1. Spring 2007 - Alfredo Riveira - Truss structures with uncertain parameters.
2. Summer 2008 - Marcela Mendoza - Optimization of truss structures.
3. Fall 2008 - Peregrino Edgardo - Complex numbers.
4. Fall 2010 - Deborah Martinez - Correlation matrix.
5. Fall 2017 - Abugalyon Yasmeen - Limits of the function with one variable.

## 15 Individual Students

1. Fall 2008 - Math 4399 - Monica Ortiz - Shape optimization.
2. Spring 2009 - Math 4399 - Garcia, Monica - Shape optimization.
3. Fall 2009 - Math 4399 - Arriaga, Richard W. - Shape optimization.
4. Fall 2009 - MATH 4370 - Ramunigari, Naveen G. - Math Software and Web Computing
5. Spring 2010 - MATH 5370 - Falcon, Fernando - Numerical analysis.
6. Fall 2010 - MATH 4399- Canales, Diego A. - Financial Mathematics.
7. Fall 2010 - MATH 4399 - Chavez, Ana E. - Web applications in education.
8. Fall 2010 - MATH 4399 - Alonso, Jorge I. - Parallel computing.
9. Spring 2011 - MATH 4399 - Casillas, Ruben A. - Visualizations.

## 16 Professional Activities/Membership

- 2017-present – member of the Editorial board/Review committee of the International Journal of Research Innovations in Civil Engineering.
- 2006-present – scientific and educational allocations on parallel computers at the Texas Advanced Computing Center (TACC) and Extreme Science and Engineering Discovery Environment (XSEDE).
- 2016-present – treasurer in the SIAM student’s organization at the University of Texas at El Paso.
- 2016-present – Member of Society for Industrial and Applied Mathematics (SIAM).
- Referee for the following journals: Optimization and Engineering, Information Science, Journal of Intelligent and Fuzzy Systems, Journal Computational and Applied Mathematics, Information Science, Fuzzy Sets and System, Engineering Structures.
- Member of the Scientific Committee of The Forth Workshop on Reliable Engineering Computing, Brno University of Technology in Brno, Czech Republic, June 13-15, 2012.
- Member of the Organizational Committee of 11th Joint NMSU/UTEP Workshop on Mathematics, Computer Science, and Computational Sciences, New Mexico State University, Las Cruces, New Mexico, Saturday, March 21, 2012.
- Member of the Organizational Committee of 10th Joint UTEP/NMSU Workshop on Mathematics, Computer Science, and Computational Sciences, University of Texas at El Paso, El Paso, Texas, Saturday, November 5, 2011.
- Member of the Organizational Committee of 9th Joint NMSU/UTEP Workshop on Mathematics, Computer Science, and Computational Sciences, New Mexico State University, Las Cruces, New Mexico, Saturday, April 2nd, 2011.
- Member of the Organizational Committee of 8th Joint UTEP/NMSU Workshop on Mathematics, Computer Science, and Computational Sciences, University of Texas at El Paso, El Paso, Texas, Saturday, November 13, 2010.
- Member of the Organizational Committee of 7th Joint NMSU/UTEP Workshop on Mathematics, Computer Science, and Computational Sciences, New Mexico State University, Las Cruces, New Mexico, Saturday, April 3, 2010.

- Member of the Organizational Committee of 6th Joint UTEP/NMSU Workshop on Mathematics, Computer Science, and Computational Sciences, University of Texas at El Paso, El Paso, Texas, Saturday, November 7, 2009.
- Member of the Organizational Committee of 5th Joint NMSU/UTEP Workshop on Mathematics, Computer Science, and Computational Sciences, New Mexico State University, Las Cruces, New Mexico, Saturday, April 4, 2009.
- Member of the Organizational Committee of 4th Joint UTEP/NMSU Workshop on Mathematics, Computer Science, and Computational Sciences, University of Texas at El Paso, El Paso, Texas, Saturday, November 8, 2008.
- Member of the Organizational Committee of 3th Joint NMSU/UTEP Workshop on Mathematics, Computer Science, and Computational Sciences, New Mexico State University, Las Cruces, New Mexico, Saturday, April 26, 2008.
- Member of the Organizational Committee of 2th Joint UTEP/NMSU Workshop on Mathematics, Computer Science, and Computational Sciences, University of Texas at El Paso, El Paso, Texas, Saturday, November 17, 2007.
- Member of the Scientific Committee of The Forth Workshop on Reliable Engineering Computing National University of Singapore, March 3-5, 2010.
- Cooperation with Microsoft in the framework of The Microsoft HPC++ CompFin Lab (2008-2010).
- Member of the Program Committee of the Third International Symposium on Imprecise Probabilities and Their Applications ISIPTA '03 and ISIPTA'05.
- Member of the Local Organization Committee of the conference FEMTEC 2006 at the University of Texas at El Paso, December 11-15, 2006.
- Member of the Local Organization Committee of the conference FEMTEC 2009. Granlibakken Conference Center, Lake Tahoe, January 5-9, 2009.
- Member of the Scientific Committee of The Third Workshop on Reliable Engineering Computing Georgia Institute of Technology, February 20-22, 2008, Savannah, GA, USA.
- Former Member of the International Association for Shell and Special Structures (IASS).
- Collaborator of the Qualitative Analysis Group at the Institute of Fundamental Technological Research, Polish Academy of Sciences, Warsaw, Poland.

## 17 Educational and Commercial Software

- Implementation of the boundary element method for solution heat transfer equation in rectangular regions (PASCAL).
- Numerical of solution of torsion problem of prismatic bars with non-circular cross-section using FEM method (PASCAL).
- Application of the Newark method for modeling of dynamics of frame structures (FORTRAN).
- Implementation of the linear programming, Rohn, Hansen and endpoint combination methods for the solution of linear interval equations (FORTRAN).
- Implementation of the interval global optimization method for modeling of truss structures problem with interval parameters (C++).
- Shape optimization of truss structures using the interval global optimization method (C++).
- Object oriented matrix library (C++).
- Solution of truss, frame, and 2D elasticity problem with interval parameters using FEM method and sensitivity analysis (C++).
- Numerical solution of slightly compressible flow equation with uncertain parameters for Chevron Oil Company (C++).
- FEM node for COCONUT environment (C++).
- c2dag converter (C++). This program converts a function written in C to an expression represented as directed acyclic graph.
- Web application for solution of truss structures with interval parameters (PHP and C++). The application utilize the interval finite element method.
- System for automatic generation of FEM equations of frame structures in symbolic form (C++ ). Implementation of sensitivity analysis in Matlab. That work was supported by COCONUT program.
- Implementation of sensitivity analysis method for solution of interval FEM equations (C++).
- Program which transforms ANSYS output files into the form readable by Matlab and apdl2interval program (C++).
- Fuzzy and interval calculator (PHP and C++).
- Commercial FEM program for modeling of frame structures for Specud Company (C++).

- Web application for calculation of interval risk of civil engineering projects (PHP and C++).
- General interval FEM program for solution of 2D and 3D elasticity problems with interval functional parameters (PHP and C++).
- Stress distribution in a reinforced concrete flexural member with uncertain structural parameters (PHP and C++).
- Application for calculation of extreme values of the center of gravity for uncertain cross-sections (Java).
- System for on-line grading of student's homework (Asp.net, WebForms, C#, ADO.NET, Microsoft SQL Server Express 2008, Latex equations, custom users controls, and user controls, automated e-mail reports).
- Solution of the stationary heat transfer equation under set uncertainty (C++).
- On-line math advisor (Asp.net, WebForms, C#, ADO.NET, Microsoft SQL Server Express 2008).
- Parallel solution of system of nonlinear equations and visualization of fractals (C++, MPICH2, MATLAB, VTK).
- Numerical solution of non-stationary heat transfer equation by using implicit and explicit the finite difference method on rectangular and non-rectangular region, and visualization (C++, Boost, MATLAB).
- Calculation of the interval risk curve (Silverlight and C#).
- Solution of systems of linear equations (C, C++, FORTRAN, LAPACK, CLAPACK, MKL, asp.net, C#).
- Numerical solution of wave equation by using explicit finite difference method on rectangular region, and visualization (C++, Boost, MATLAB).
- Numerical solution of vibration of beam by using explicit and implicit finite difference method on rectangular region, and visualization (C++, Boost, MATLAB).
- Numerical solution of plate vibrations by using explicit finite difference method on rectangular region, and visualization (C++, Boost, MATLAB).
- Parallel numerical integration (FORTRAN, C++, MPICH2).
- Parallel numerical integration by using Monte Carlo simulations (FORTRAN, C++, MPICH2).
- Distributed calculation of the integral by using TCP client/server socket communications (C#, Java).

- Visualizations of parametric surfaces (C++).
- Numerical solution of system of ordinary differential equations by using the finite difference method and visualization (C++, MATLAB).
- Graph of the functions by using VTK and Java.
- Graph of the functions in bmp file format (C).
- Numerical integration by using web-based distributed computing (C#, ASP.NET, PHP, C++, CGI).
- Interactive web-based visualization of the solution of non-stationary heat transfer equation (JAVA, ASP.NET)
- Interactive web-based visualization of the solution of non-stationary heat transfer equation over non-rectangular region (ASP.NET, C#)
- I developed next version of the general FEM program with the interval parameters. New features: visualization of the solution in MATLAB, interval von Mises stress, uncertain geometry (C++).
- Adaptive mesh generation for 2D elasticity problem (Mathematica, C++).
- Web-application for numerical solution of the ordinary differential equation by using Hermite interpolation with the interval parameters and visualization of the results (ASP.NET, C#).
- Numerical methods for the solution and visualization of stochastic partial differential equations (C++).
- Numerical solution of the interval differential equations by using adaptive approximation (ASP.NET).
- Numerical solution of the interval differential equations by using adaptive approximation (Silverlight, C#).
- Numerical evaluations of the stochastic integrals (C++).
- Numerical solution of the stochastic differential equations (C++, Matlab).
- Parallel matrix-matrix and matrix-vector multiplication by using OpenMP (C).
- Numerical solution of the interval differential equations (C++).
- Numerical solution of the stochastic partial differential equations (C++, MPI).
- Solution of the beam equation with uncertain parameters (C, MATLAB).
- Automatic generation of student's assignments (C#).

- Parallel solution of 1D, 2D and 3D non-stationary heat equation (C, MPI).
- Parallel solution of the inverse non-stationary heat transfer problem (C).
- Dynamics of 3D elasticity by using the finite element method (C++).
- Self-adaptive software for solving a class of abstract mathematical problems (machine learning, artificial intelligence, distributed computing).
- Parallel LU decomposition (Intel Click, C).
- Parallel matrix multiplication (Python, Intel MKL, C),
- Parallel solution of the wave equation (MPI, C).
- Parallel Solution of the heat equation (MPI, C).
- Solution of the nonlinear multiphase flow equations (C).
- Solution of the nonlinear wave equation by using the finite difference method (Matlab).
- Solution of the wave equation by using the finite difference method and the multigrid solver (Matlab).
- Solution of the wave equation by using the finite element method and the multigrid solver (Matlab).

## 18 Software Related Activity and Skills

- Webmaster for the Institute of Theoretical Mechanics, Gliwice, Poland.
- Server administrator (Solaris, Red Hat Linux, Aurora Linux, Windows Server 2000, 2003, 2008, 2012).
- Administrator of several MPI compute clusters (Linux, Windows MPICH, and Windows HPC Server).
- Cloud computing technology (Amazon EC2, Windows Azure).
- Mathematical software (Mathematica, Matlab, Mathcad, Derive, Scilab, Octave, Maxima, R, Minitab).
- Numerical libraries (BLAS, LAPACK, ATLAS, Intel MKL, GSL Library, IMSL ?Numerical Libraries, PETSc, ScaLAPACK, Intel Cluster Toolkit).
- Engineering software (ANSYS, ABACUS, NASTRAN, ROBOT, RM WIN, RISA 2D, RISA 3D).
- Database system (MS SQL Server, My SQL, MS Access, Informix, Excel).



- Computer languages (C, C++, FORTRAN, Java, Java Script, C#, VB, Asp.Net, PHP, SQL, Pascal, Delphi, Python, XML, Bash, Windows PowerShell). I am familiar with Assembler, Lisp, F#, Scheme, and Hascal. I developed many simply domain specific scripting languages which I use in my software.
- Parallel programming (MPI, OpenMP, POSIX Threads, Nvidia CUDA, Intel Cilk, Kokkos, C++17, System.Threading in C#).

## **19 Teaching at the University of Texas at El Paso (2006-present)**

### **19.1 Graduate Classes**

Mathematical and Computer Modeling, Introduction to Computational Science, Graduate Seminar.

### **19.2 Undergraduate Classes**

Precalculus, Calculus I, Calculus II, Calculus III, Math for Social Sciences, Introduction to Higher Mathematics, Matrix Algebra, Numerical Analysis, Applied Analysis I, Individual Study in Mathematics, Geometry and Calculus.

## **20 Teaching at the Silesian University of Technology (1995-2005), Poland**

### **20.1 Graduate Classes**

Theory of Elasticity, Theory of Plasticity.

### **20.2 Undergraduate Classes**

Mathematical Methods in Civil Engineering, Theoretical Mechanics, Reliability and Safety of Structures, Introduction to Computer Science, Numerical Methods in Civil Engineering, Strength of Materials, Statistics for Civil Engineers.

## **21 Service at the University of Texas at El Paso**

- 2010-present Undergraduate Advisor.
- 2009-2010 I was scheduling colloquia at the Department of Mathematical Sciences.
- 2007-2009 Hiring Lecturers Committee.

- 2008-2009 Graduate Recruiting Committee,
- 2007-2008 Student Competitions Committee.
- 2008 Undergraduate Core Curriculum Committee.
- 2007 Graduate Recruiting Committee.
- 2006 Undergraduate Recruitment Committee.

## **22 Service at Silesian University of Technology**

- 1995-2005 Qualifying Exam Committee.
- 1999-2001 Service for the Library.
- 1997-1999 Scheduling of classes for the Department of Civil Engineering.
- 1995-2006 Website and network administrator for the Institute of Theoretical Mechanics.

## **23 Languages**

- English
- Polish
- Spanish - basic,
- German - basic.