

# Curriculum Vitae

Rumen Kostadinov Uluchev

## Address

Faculty of Mathematics and Informatics  
Sofia University St. Kliment Ohridski  
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## Education

- **Ph.D. in Mathematics**, Sofia University St. Kliment Ohridski, Bulgaria, 1990  
*Thesis:* “Problems on Optimal Interpolation”
- **M.Sc. in Mathematics**, Sofia University St. Kliment Ohridski, Bulgaria, 1983  
*Thesis:* “Hermite Interpolation by Polynomials and Rational Functions”

## Research Interests

Approximation theory, Numerical analysis, Optimal interpolation, Splines, Extremal problems

## Professional Experience

- **Associate Professor**, Faculty of Mathematics and Informatics, Sofia University St. Kliment Ohridski, Sofia, Bulgaria, 2016-present
- **Associate Professor, Vice-Rector in Education**, University of Transport, Sofia, Bulgaria, 2008-2016
- **Associate Professor, Deputy Dean**, Faculty of Equipment, Technology and Management of Transport, University of Transport, Sofia, Bulgaria, 2002-2008
- **Assistant Professor**, Department of Mathematics and Informatics, University of Transport, Sofia, Bulgaria, 1990-2002

## Teaching Experience

- **Associate Professor**, Faculty of Mathematics and Informatics, Sofia University St. Kliment Ohridski, Sofia, Bulgaria, 2016-present  
*Courses:* Numerical Methods, Software for Scientific Computations, Mathematics (for students in Economics)
- **Associate Professor and Assistant Professor**, Department of Mathematics and Informatics, University of Transport, Sofia, Bulgaria, 1990-2016  
*Courses:* Linear Algebra and Analytic Geometry, Univariate Calculus, Multivariate Calculus, Special Course (elements of Probabilities, Complex Analysis, Differential Equations, Fourier Series), Mathematical Modelling (Optimizations, Game Theory), Applied Mathematics (Numerical Methods, Laplace Transform), Financial Mathematics

## List of Publications

1. D. K. Dimitrov, I. Gadjev, G. Nikolov and R. Uluchev, Hardy's inequalities in finite dimensional Hilbert spaces, *Proceedings of the AMS* **149** (2021), no. 6, 2515-2529.
2. I. Gadjev and R. Uluchev, Strong converse result for weighted approximation by Baskakov-Kantorovich operator, in "Constructive Theory of Functions, Sozopol 2019" (B. Draganov, K. Ivanov, G. Nikolov and R. Uluchev, Eds.), pp. 53-71, Prof. Marin Drinov Publishing House of BAS, Sofia, 2020.
3. G. Nikolov and R. Uluchev, Bounds for the extreme zeros of Laguerre polynomials, in "Numerical Methods and Applications. 9th International Conference, NMA 2018" (G. Nikolov, N. Kolkovska and K. Georgiev, Eds.), *LNCS* **11189** (2019), pp. 243-250, Springer, 2019.
4. V. Ivanova and R. Uluchev, Smoothest interpolation with boundary conditions in  $W_2^3[a,b]$ , *Ann. Sofia Univ. Fac. Math. Inf.* **106** (2019), 153-174.
5. I. Gadjev, P. Parvanov and R. Uluchev, Weighted approximation by Kantorovich type modification of Meyer-König and Zeller operator, *Ann. Sofia Univ. Fac. Math. Inf.* **105** (2018), 75-95.
6. G. Nikolov and R. Uluchev, Estimates for the best constant in a Markov  $L_2$ -inequality with the assistance of computer algebra, *Ann. Sofia Univ. Fac. Math. Inf.* **104** (2017), 55-75.
7. I. Georgieva, C. Hofreither and R. Uluchev, Approximations using Radon projection data in the unit disc, in "Recent Approaches to Numerical Analysis: Theory, Methods and Applications" (G. Akrivis, et al., Eds.), pp. 116-122, Proceedings of NumAN2014 Conference, Sept. 2-5, Chania, Crete, Greece, 2014.
8. I. Georgieva, C. Hofreither and R. Uluchev, Least squares fitting of harmonic functions based on Radon projections, in "Curves and Surfaces" (M. Floater et al., Eds.), MMCS 2012, LNCS vol. 8177, pp. 158-171, Springer-Verlag, Berlin Heidelberg, 2014.
9. I. Georgieva, C. Hofreither and R. Uluchev, Interpolation of mixed type data by bivariate polynomials, in "Constructive Theory of Functions, Sozopol 2010" (G. Nikolov and R. Uluchev, Eds.), pp. 93-107, Prof. Marin Drinov Academic Publishing House, Sofia, 2012.
10. L. Dechevsky and R. Uluchev, Hermite interpolation using ERBS with trigonometric polynomial local functions, in: "Large-Scale Scientific Computations 2011" (I. Lirkov, S. Margenov and J. Wasniewski, Eds.), pp. 411-419, LNCS vol. 7116, Springer, Heidelberg, 2012.
11. I. Georgieva, C. Hofreither and R. Uluchev, Interpolation in the unit disk based on Radon projections and functions values, DK Report No. 2010-14, Johannes Kepler University, Linz, 2010.
12. I. Georgieva and R. Uluchev, On interpolation in the unit disk based on both Radon projections and function values, in: "Large-Scale Scientific Computations 2009" (I. Lirkov, S. Margenov, J. Wasniewski Eds.), LNCS vol. 5910, pp. 752-760, Springer-Verlag, Berlin Heidelberg, 2010.
13. I. Georgieva and R. Uluchev, Surface reconstruction and Lagrange basis polynomials, in: "Large-Scale Scientific Computations 2007" (I. Lirkov, S. Margenov, J. Wasniewski, Eds.), LNCS vol. 4818, pp. 670-678, Springer-Verlag, Berlin Heidelberg, 2008.
14. I. Georgieva and R. Uluchev, Smoothing of Radon projections type of data by bivariate polynomials, *J. Comput. Appl. Math.* **215** (2008), no. 1, 167-181.
15. G. Nikolov and R. Uluchev, Inequalities for real-root polynomials. Proof of a conjecture of Foster and Krasikov, in: "Approximation Theory: A Volume Dedicated to Borislav Bojanov" (D. K. Dimitrov, G. Nikolov and R. Uluchev, Eds.), pp. 201-216, Prof. Marin Drinov Academic Publishing House, Sofia, 2004.
16. R. Uluchev, On a conjecture of polynomial zeros, in "Constructive Theory of Functions, Varna 2002", pp. 440-445, DARBA, Sofia, 2003.
17. R. Uluchev, Geometric Birkhoff interpolation with parametric quadratic splines, in "Constructive Theory of Functions '91", pp. 277-283, BAN, Sofia, 1992.

18. R. Uluchev, Smoothest interpolation with free nodes in  $W_p^r$ , in "Progress in Approximation Theory," pp. 787-806, Academic Press, San Diego, 1991.
19. R. Uluchev, On the uniqueness of the smoothest interpolant with free nodes in  $W_p^r$ , *Compt. Rend. Acad. Bulg. Sci.*, **43** (1990), 31-34.
20. R. Uluchev, B-splines with Birkhoff knots. Applications in the approximations and shape-preserving interpolation, *Math. Balk. (New Series)* **3** (1989), 225-239.
21. R. Uluchev, On the critical points of a polynomial of third degree, in "Mathematics and Mathematical Education 1988", pp. 200-203, BAN, Sofia, 1988.
22. G. Grozev and R. Uluchev, A problem on Blaschke products, in "Constructive Theory of Functions '87," pp. 184-190, BAN, Sofia, 1988.
23. R. Uluchev, An extremal problem in the set of Blaschke products with fixed multiplicities of the zeros, *SERDICA Bulg. math. publ.* **14** (1988), 98-101.
24. G. Nikolov and R. Uluchev, A comparison theorem for Tchebysheff polynomials, *SERDICA Bulg. math. publ.* **14** (1988), 95-97.
25. R. Uluchev, Interpolations by continued fractions at nodes with multiplicities, in "Mathematics and Mathematical Education 1984," pp. 197-202, BAN, Sofia, 1984 [in Bulgarian].

## Presentations and Conference Contributions

1. Smoothest interpolant in the space  $W_2^3[a,b]$  satisfying boundary conditions (*with V. Ivanova*)  
9<sup>th</sup> CMAPT Workshop, Computational Mathematics and APproximation Theory  
June 13-17, 2022, Strobl/St. Wolfgang (AUSTRIA)
2. Weighted approximation of functions in  $L_p$ -norm by Kantorovich type operators (*with I. Gadjev*)  
ICNAAM 2019, 17<sup>th</sup> International Conference of Numerical Analysis and Applied Mathematics  
September 23-28, 2019, Rhodes (GREECE)
3. Weighted approximation by Kantorovich type modification of Meyer-König and Zeller operator (*with I. Gadjev and P. Parvanov*)  
8<sup>th</sup> CMAPT Workshop, Computational Mathematics and APproximation Theory  
August 24-28, 2019, Strobl/St. Wolfgang (AUSTRIA)
4. On the sharp constant in Hardy inequalities for a class of weighted polynomials and for finite sequences (*with D. K. Dimitrov, I. Gadjev and G. Nikolov*)  
AnMath 2019, First Analysis Mathematica International Conference  
August 12-17, 2019, Budapest (HUNGARY)
5. On Hardy  $L_2$ -inequality in certain finite dimensional spaces (*with D. K. Dimitrov, I. Gadjev and G. Nikolov*)  
IWOTA 2019, International Workshop on Operator Theory and its Applications  
July 22-26, 2019, Lisbon (PORTUGAL)
6. On Hardy  $L_2$ -inequality in certain finite dimensional spaces (*with D. K. Dimitrov, I. Gadjev and G. Nikolov*)  
International Conference "Constructive Theory of Functions"  
June 02-08, 2019, Sozopol (BULGARIA)
7. Weighted approximation by Kantorovich type modification of Meyer-König and Zeller operator (*with I. Gadjev and P. Parvanov*)  
FMI Spring Scientific Session  
March 16-16, 2019, FMI, Sofia (BULGARIA)
8. Bounds for the extreme zeros of Laguerre polynomials and Hermite polynomials (*with G. Nikolov*)  
7<sup>th</sup> CMAPT Workshop, Computational Mathematics and APproximation Theory  
September 02-08, 2018, Sozopol (BULGARIA)

9. Bounds for the extreme zeros of Laguerre polynomials (*with G. Nikolov*)  
9th International Conference on Numerical Methods and Applications (NM&A'18)  
August 20-24, 2018, Borovest (BULGARIA)
10. New bounds for the extreme zeros of Laguerre polynomials (*with G. Nikolov*)  
IX Jaen Conference on Approximation  
July 08-13, 2018, Ubeda (SPAIN)
11. Improved estimates for the best constant in a Markov  $L_2$ -inequality (*with G. Nikolov*)  
14th Serbian Mathematical Congress  
May 16-19, 2018, Kragujevac (SERBIA)
12. Estimates for the best constant in a Markov  $L_2$ -inequality with the assistance of computer algebra (*with G. Nikolov*)  
Jubilee Conference dedicated to Jaroslav Tagamlitzki  
September 15-17, 2017, FMI, Sofia (BULGARIA)
13. Estimates for the best constant in a Markov  $L_2$ -inequality with the assistance of computer algebra (*with G. Nikolov*)  
6th CMAPT Workshop, Computational Mathematics and APproximation Theory  
September 05-09, 2017, Linz (AUSTRIA)
14. Finite Blaschke products in approximations  
Workshop "Approximation Theory, CAGD, Numerical Analysis and Symbolic Computation"  
September 07-10, 2016, Sofia (BULGARIA)
15. Approximations using Radon projection data in the unit disc (*with I. Georgieva and C. Hofreither*)  
NumAN2014 Conference in Numerical Analysis  
September 02-05, 2014, Chania, Crete (GREECE)
16. B-splines. Applications. Generalizations  
Workshop "Approximation Theory, CAGD, Numerical Analysis and Symbolic Computation"  
August 25-30, 2013, Sozopol (BULGARIA)
17. Interpolation and fitting by harmonic polynomials based on Radon projections (*with I. Georgieva and C. Hofreither*)  
International Conference "Constructive Theory of Functions"  
June 9-15, 2013, Sozopol (BULGARIA)
18. Hermite interpolation using ERBS with trigonometric polynomial local functions (*with L. Dechevsky*)  
Interdisciplinary Seminar "Approximation Theory, Numerical Analysis and Symbolic Computation"  
August 31 - September 5, 2012, Sozopol (BULGARIA)
19. Hermite interpolation using ERBS with trigonometric polynomial local functions (*with L. Dechevsky*)  
8th International Conference "Large-Scale Scientific Computations"  
June 6-10, 2011, Sozopol (BULGARIA)
20. Interpolation in the unit disk based on Radon projections and function values (*with I. Georgieva and C. Hofreither*)  
7th International Conference "Curves and Surfaces"  
June 24-30, 2010, Avignon (FRANCE)
21. Interpolation of mixed type data by bivariate polynomials (*with I. Georgieva and C. Hofreither*)  
International Conference "Constructive Theory of Functions"  
June 3-10, 2010, Sozopol (BULGARIA)
22. On interpolation in the unit disk based on both Radon projections and function values (*with I. Georgieva*)  
7th International Conference "Large-Scale Scientific Computations"  
June 4-8, 2009, Sozopol (BULGARIA)
23. On interpolation and smoothing by bivariate polynomials using line integrals (*with I. Georgieva*)  
International Conference "Constructive Theory of Functions"  
June 3-9, 2008, Campos do Jordao (BRASIL)

24. Surface and image reconstruction using Radon projections type of information (*with I. Georgieva*)  
Meeting "New Methods for Quadratures"  
September 13-19, 2007, Sozopol (BULGARIA)
25. Surface reconstruction and Lagrange basis polynomials (*with I. Georgieva*)  
6<sup>th</sup> International Conference "Large-Scale Scientific Computations"  
June 4-8, 2007, Sozopol (BULGARIA)
26. Smoothing of Radon type of data (*with I. Georgieva*)  
International Workshop "Approximation Theory"  
September 1-7, 2006, Kiten (BULGARIA)
27. Regular schemes for bivariate polynomial reconstruction based on Radon projections (*with I. Georgieva*)  
International Conference "Pioneers of the Bulgarian Mathematics"  
July 8-10, 2006, Sofia (BULGARIA)
28. On a conjecture of polynomial zeros  
International Conference "Constructive Theory of Functions"  
June 19-23, 2002, Varna (BULGARIA)
29. Smoothest interpolation with free nodes in  $W_p^r$   
Minisemester "Approximation and Complexity of Algorithms"  
February, 1995, Warsaw (POLAND)
30. Geometric Birkhoff interpolation with parametric quadratic splines  
International Conference "Constructive Theory of Functions"  
May 28 - June 3, 1991, Varna (BULGARIA)
31. Smoothest interpolation  
International Symposium "Optimal Algorithms"  
May 29 - June 2, 1989, Varna (BULGARIA)
32. On the critical points of a polynomial of third degree  
17<sup>th</sup> Spring Conference of the Union of Bulgarian Mathematicians  
"Mathematics and Mathematical Education"  
April 6-9, 1988, Slanchev Bryag (BULGARIA)
33. A problem on Blaschke products  
International Conference "Constructive Theory of Functions"  
May 24-31, 1987, Varna (BULGARIA)
34. Interpolation by continued fractions at nodes with multiplicities  
13<sup>th</sup> Spring Conference of the Union of Bulgarian Mathematicians  
"Mathematics and Mathematical Education"  
April 6-9, 1984, Slanchev Bryag (BULGARIA)

## Editorial Work

1. "Constructive Theory of Functions, Sozopol 2019" (B. Draganov, K. Ivanov, G. Nikolov and R. Uluchev, Eds.), Prof. Marin Drinov Publ. House BAS, Sofia, 2020.
2. "Numerical Methods and Applications. 9<sup>th</sup> International Conference, NMA 2018" (G. Nikolov, N. Kolkovska, K. Georgiev, Eds.; S. Dimova and R. Uluchev, Managing Editors), LNCS **11189**, Springer, 2019.
3. "Constructive Theory of Functions, Sozopol 2016" (K. Ivanov, G. Nikolov and R. Uluchev, Eds.), Prof. Marin Drinov Acad. Publ. House, Sofia, 2018.

4. “Constructive Theory of Functions, Sozopol 2013: A Volume Dedicated to Blagovest Sendov and to the Memory of Vasil Popov” (K. Ivanov, G. Nikolov and R. Uluchev, Eds.), Prof. Marin Drinov Acad. Publ. House, Sofia, 2014.
5. “Constructive Theory of Functions, Sozopol 2010: In Memory of Borislav Bojanov” (G. Nikolov and R. Uluchev, Eds.), Prof. Marin Drinov Acad. Publ. House, Sofia, 2011.
6. “Approximation Theory: A Volume Dedicated to Borislav Bojanov” (D. K. Dimitrov, G. Nikolov and R. Uluchev, Eds.), Prof. Marin Drinov Acad. Publ. House, Sofia, 2004.

## Scientific Projects

1. Theory and Algorithms for Approximation with Polynomials and Splines, 2019-2022  
Bilateral project KP-06-Austria/8/2019 (WTZ BG 03/2019), funded by Bulgarian National Science Fund and OeAD (Austria).
2. Low-Rank, Polynomial and Spline Approximations and Applications, 2017-2019  
Bilateral project DNTS Austria 01/3, funded by Bulgarian National Science Fund and OeAD (Austria).
3. Contemporary Methods in Constructive Theory of Functions, 2016-2019  
Grant DN 02/14, supported by the Bulgarian National Science Fund, Ministry of Education and Science.
4. Numeric-Symbolic Approximation with Radon Projections, 2014-2015  
Grant DNTS Austria 01/6/2013 in the framework of the “Wissenschaftlich-technische Zusammenarbeit” (WTZ) organized by the Osterreichischer Austauschdienst (OeAD) and by the Bulgarian Ministry of Education and Science.
5. Effective Methods and Algorithms for Geometric Modelling, 2012-2014, Project Leader  
Grant DFNI-T01/0001, supported by the Bulgarian National Science Fund, Ministry of Education and Science.
6. Modern Methods in Approximation Theory, 2010-2013  
Grant DDVU 02/30, supported by the Bulgarian National Science Fund, Ministry of Education and Science.
7. Mathematical Methods and Algorithms for Computer Tomography, 2007-2010, Project Leader  
Grant VU-I-303/2007, supported by the Bulgarian National Science Fund, Ministry of Education and Science.
8. Extremal Problems in Approximation Theory, 2004-2007  
Grant MM-1402/2004, supported by the Bulgarian National Science Fund, Ministry of Education and Science.

## Software and Educational Projects

1. Development of Electronic Forms for Distance Learning and Setting up a Virtual Library at Todor Kableshkov University of Transport, Sofia,  
Operational Programme “Human Resources Development 2007–2013”,  
co-funded by European Social Fund, 2013-2014  
E-courses for Moodle: (i) *Mathematics I* (Linear Algebra and Analytic Geometry),  
(ii) *Quantitative Methods for Business*.
2. National Educational Portal – Mathematics for IX class, Ministry of Education and Science, 2006.
3. Numerical Analysis Software Package, University of Sofia, 1986.
4. Software Simulator for Parallel Computations, Bulgarian Academy of Sciences, 1986-1987.