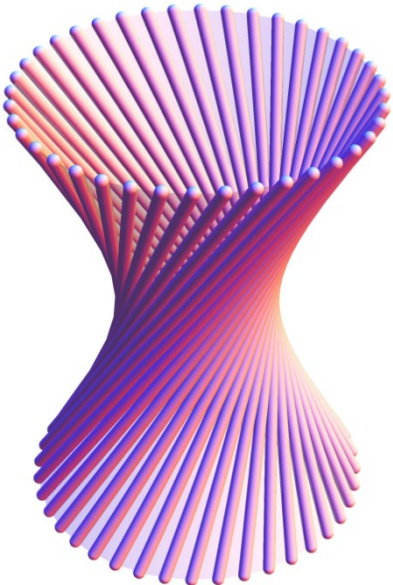


RESEARCH CENTER FOR APPLIED MATHEMATICS IN ENGINEERING SCIENCES

Contact details

Name	Research Center for Applied Mathematics in Engineering Sciences	
Acronym	RAMSES	
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Site	https://research.utcluj.ro/tl_files/research/Research%20Domain/Matematica-Informatica/RAMSES_Ivan.pdf	
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Areas of expertise

Numerical Analysis

-New methods and tools in Approximation Theory; Application of *MATHEMATICA*'s approximation subroutines; High degree quadrature formulas; New algorithms for energy-minimizing curves and surfaces

Functional, Differential, and Integral Equations and Calculus of Variations

-Existence and representation of single-valued and multivalued solutions. Hyers-Ulam stability of equations in algebraic and topological structures; Applications to the stability and perturbations of Dynamical Systems.

-Generalized equations of Euler-Lagrange and Euler-Gauss type used in the theory of 2D and 3D deformable models

Geometry

-Geometry of image formation in stereo vision, different camera models, calibration, systems of multiple lenses and mirrors of a specific type; Manifold learning and pattern recognition

Operator theory and Special functions

-Multivalued operator theory, which is about the investigation of the fixed point properties of special multivalued operators; Investigating the properties of special functions, Riemann zeta, Hurwitz zeta, and Polylogarithm functions

Modelling

-Ultrasound echocardiography; Computer-aided surgery (Prosthetic medicine); Dynamic image-based modelling

Nonlinear and Convex Analysis and Mathematical Programming/Optimization

-Equilibrium problems; Optimization; Variational inequalities; Numerical Optimization; Numerical Optimization

Team

Prof. Mircea Ivan; Prof. Ioan Gavrea; Prof. Ioan Raşa; Prof. Alexandru Ioan Mitrea; Prof. Dorian Popa; Prof. Daniela Rosca; Prof. Ioan Radu Peter; Prof. Alina Sîntămărian; Prof. Dalia Cimpean; Prof. Daniela Inoan; Prof. Constantin-Cosmin Todea; Assoc. Prof. Adela Novac; Assoc. Prof. Mircea Dan Rus; Assoc. Prof. Ovidiu Furdui; Assoc. Prof. Adrian Holhos; Assoc. Prof. Adela Capătă; Assoc. Prof. Alina Ramona Baias; Assoc. Prof. Diana Otrocol; Assist. Prof. Vicuta Neagos;

Representative projects

Cohmetblfg – “Cohomological Methods in the Study of Blocks and Characters of Finite Groups”, PN-III-P1-1.1-TE-2019-0745, (2020-2022)

DynAPSNeur, “Dynamics Analysis of Parallel Simulations of Biological Neural Microcircuits”, FP7 “Research Infrastructures” action (January 1 - December 30, 2013)

<http://www.hp-see.eu/hp-see-pilot-call-awarded-applications>

MoDef, “Modelling using advanced methods and techniques based on the theory of deformable surfaces with applications in computer-assisted surgery and other modelling procedures of anatomic structures”, PNII Partnership, <http://dicomge.utcluj.ro/modelf> (2007-2010)

“Advanced Methods and Algorithms of Mathematics related to the Theory of Deformable Models, with applications in image processing and medicine”, CNCSIS, (2006-2008)

“Denoising and compression of data on high-dimensional manifolds”, Deutsche Forschung Gemeinschaft, Bilateral

cooperation Germania – Romania PL 170/14-1, Georg Austin University, Göttingen, (January 1 - December 31, 2011)
“Denoising and compression of spherical data”, *Deutsche Forschung Gemeinschaft* (2007 –2010),
DESPED, **“Stereo Based Object Tracking and Pedestrian Recognition in Traffic and Environments”**, *Wolkswagen AG*, Germania (2006-2007) , (coord. professor Sergiu Nedevschi).
CRIO LAPSIM, **“Laparoscopic Cryosurgical Treatment of the renal tumours individualized using simulations on 3D reconstructed model”**, *CEEEX* (2006-2008) director TUCN prof. eng. Sergiu Nedevschi (in cooperation with “Institutul Clinic de Urologie și Transplant Renal” Cluj-Napoca

Significant results

The most representative publications of the last years

1. Kajántó S, Kristály A, Peter I, Zhao W. A generic functional inequality and Riccati pairs: an alternative approach to Hardy-type inequalities. *Mathematische Annalen. Math. Ann.* (2024). <https://doi.org/10.1007/s00208-024-02827-7>
2. Baias, A.R., Popa, D., Rassias, M. Th.: Set-valued solutions of an equation of Jensen type, *Quaest. Math.* 8(1), doi: 10.2989/16073606.2022.2072249, (2022).
3. Ivan, M., Neagos, V., A representation of the interpolation polynomial, *Numerical Algorithms* 88 (2021), 1215—1231, <https://doi.org/10.1007/s11075-021-01072-2>
4. Ignat, R., Rus, M.D., Vortex sheet solutions for the Ginzburg-Landau system in cylinders: symmetry and global minimality, *Calculus of Variations and Partial Differential Equations* 63 (2024), Art. no. 34, <https://dx.doi.org/10.1007/s00526-023-02628-x>
5. A. Holhoş, Exponential-Type Operators Generated by Power Functions, *Bulletin of the Iranian Mathematical Society*, vol. 51, 2025, 64, 13 pp, <https://doi.org/10.1007/s41980-025-00995-z>
6. Holhoş A., A Voronovskaya-type theorem in simultaneous approximation, *Period. Math. Hungar.* 85 (2022), 280-291, <https://doi.org/10.1007/s10998-021-00434-6>
7. Holhoş, A. Voronovskaya-type Results for Positive Linear Operators of Exponential Type and their Derivatives. *Bull. Malays. Math. Sci. Soc.* 45 (2022), 1839–1861, <https://doi.org/10.1007/s40840-021-01227-3>
8. Holhoş, A. Approximation of Real Functions by a Generalization of Ismail–May Operator. *Mathematics* (2022), 10, 1650, <https://doi.org/10.3390/math10101650>
9. A. Holhoş, D. Roşca, Orthonormal Wavelet Bases on The 3D Ball Via Volume Preserving Map from The Regular Octahedron. *Mathematics* (2020) 8 (6), 994, 15 pp. doi: 10.3390/math8060994
10. Aadi, S.B., Akhlil, K., and Inoan, D. Equilibrium problems with trifunctions and applications to hemivariational inequalities. *Anal. Math. Phys.* **15**, 125 (2025). <https://doi.org/10.1007/s13324-025-01123-0>
11. Ana Maria Acu, Ioan Raşa, Rekha Srivastava, Modified operators interpolating at endpoints, *Mathematics* 2021, 9(17), 2021; <https://doi.org/10.3390/math9172051>
12. Ana Maria Acu, Gülen Başcanbaz-Tunca, Ioan Rasa, Voronovskaja type quantitative results for differences of positive linear operators, *Symmetry* 2021, 13(8), 1392; <https://doi.org/10.3390/sym13081392>
13. Ulrich Abel, Dany Leviatan and Ioan Rasa, On the q-monotonicity preservation of Durrmeyer-Type operators, *Mediterranean Journal of Mathematics* volume 18, Article number: 173 (2021) , <https://doi.org/10.1007/s00009-021-01823-4>
14. Capătă, A.: On vector quasi-equilibrium problems via a Browder-type fixed-point theorem, *Bull. Malays. Math. Sci. Soc.* 46 (1), 14 (2023), doi: 10.1007/s40840-022-01397-8. Capătă, A.E.: Generalized vector quasi-equilibrium problems, *Mathematics* 12 (6), 809 (2024), doi: 10.3390/math12060809.
15. A. Novac, D. Otrocol, D. Popa, On Ulam stability of a partial differential operator in Banach spaces, *Mathematics*, 11 (2023) no. 11, art. no. 2488, <https://doi.org/10.3390/math11112488>
16. Veronica Ilea, Adela Novac, Diana Otrocol, Radu Precup, Solutions with a prescribed interval of positivity for differential systems with nonlocal conditions, *Applied Mathematics and Computation* 375, 125092, <https://doi.org/10.1016/j.amc.2020.125092>.
17. V. Ilea, A. Novac, D. Otrocol, R. Precup, Nonlinear alternatives of hybrid type for oneself vector-valued maps and application, *Fixed Point Theory*, 24(2023), No. 1, 221-232, DOI: 10.24193/fpt-ro.2023.1.11, <https://www.math.ubbcluj.ro/~nodeacj/volumes/2023-No1/231-ile-nov-otr-pre.php>, ISSN: 1583-5022
18. Cimpean, D.S. (2022), Dynamics of Colloidal Mixture of Cu-Al₂O₃/Water in an Inclined Porous Channel Due to Mixed Convection: Significance of Entropy Generation, *Coatings*, 12(9):1347, <https://doi.org/10.3390/coatings12091347>
19. Patrulescu, F.O., Grosan, T., Cimpean, D.S. (2025) Significance of Inclination and Energy Loss for a Free Convection Flow in a Chamber Filled with a Bidisperse Porous Medium. *Transp Porous Med* 152, 91. <https://doi.org/10.1007/s11242-025-02225-w>, 0169-3913
20. Costea C, Ghemougui Dridi H, Ben-Beya B, Cimpean DS (2026), "Effect of both cavity and magnetic field inclinations on natural convection flow through a porous medium under variable thermal conditions". *International Journal of Numerical Methods for Heat & Fluid Flow*, Vol. 36 No. 1 pp. 328–349, doi: <https://doi.org/10.1108/HFF-07-2025-0518>
21. Tiberiu Coconet, Constantin-Cosmin Todea, Stable unital bases, hyperfocal subalgebras and basic Morita equivalences, *Algebras and Representation Theory*, Volume 27, (2024), 203-218, <https://doi.org/10.1007/s10468-023-10216-y>
22. Aljanaideh, K., Furdui, O., Bernstein, D.S.: On the McMillan degree of full-normal-rank transfer functions, *Internat. J. Control* 94 (12), 2021, 3439–3447. DOI: 10.1080/00207179.2020.1766701

The offer is addressed to the economic environment

Research & development	Development of original solutions for modeling dynamic 3D environments; Development of real-time perception systems for structured or unstructured 3D environments, applied to drive assistance systems, autonomous robots, space observation, or computer-assisted medical diagnosis.
Consulting	Consulting, designing, and researching pattern recognition and machine learning for industrial and

	scientific fields.
Training	Image processing basics: Image processing algorithms and techniques, pattern recognition, machine learning, kernel methods with applications across different fields (computer vision, neuroscience, medical, speech recognition); Numerical optimization algorithms, time-stepping schemes for rigid-body systems with applications to robotics, autonomous navigation, and granular materials.

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