CURRICULUM VITAE

MARKO RADULOVIĆ

General information

Name: Marko
Surname: Radulović
Place of birth: Zagreb, Croatia
Nationality: croatian
Web-page: `https://web.math.pmf.unizg.hr/~mradul/`
E-mail: mradul@math.hr

Academic degrees

Ph.D.	may 2019.	Doctoral Programme in Mathematics Department of Mathematics, Faculty of Science, University of Zagreb Ph.D. Thesis: *Mathematical analysis of the nonsteady flow of micropolar fluid in a thin domain* Advisor: Igor Pažanin, Professor
M.Sc.	september 2014.	Graduate University Programme in Applied Mathematics Department of Mathematics, Faculty of Science, University of Zagreb Master Thesis: *Mathematical formulations of the uncertainty principle* Advisor: Vjekoslav Kovač, Professor
B.Sc.	july 2012.	Undergraduate University Programme in Mathematics Department of Mathematics, Faculty of Science, University of Zagreb

Research interests

Mathematical modeling in fluid mechanics, asymptotic analysis of equations stated in thin domains, mathematical analysis of the well-posedness of boundary and initial-boundary problems for PDEs in fluid mechanics, mathematical modeling in biology

Academic positions

2026. –	Associate Professor Division of Applied Mathematics Department of Mathematics, Faculty of Science, University of Zagreb
2021. – 2026.	Assistant Professor Division of Applied Mathematics Department of Mathematics, Faculty of Science, University of Zagreb
2019. – 2021.	Postdoctoral researcher Division of Applied Mathematics Department of Mathematics, Faculty of Science, University of Zagreb
2018. – 2019.	Assistant-PhD student on the project of the Croatian Science Foundation *Asymptotic analysis of the boundary value problems in continuum mechanics* (IP 2018–01–2735) Division of Applied Mathematics Department of Mathematics, Faculty of Science, University of Zagreb
2016. – 2018.	Assistant-PhD student on the project of the Croatian Science Foundation *Mathematical modeling and numerical simulations of processes in thin or porous domains* (IP 2013-11-3955) Division of Applied Mathematics Department of Mathematics, Faculty of Science, University of Zagreb

Scientific papers in journals

1) E. Marušić-Paloka, I. Pažanin, M. Radulović, *Flow of a micropolar fluid through a channel with small boundary perturbation*, Zeitschrift für Naturforschung A 71(7) (2016), 607-619. (CC, SCIE, Q3 – Physics, Multidisciplinary, IF=1,7)
2) U.S. Mahabaleshwar, I. Pažanin, M. Radulović, F.J. Suárez-Grau, *Effects of small boundary perturbation on the MHD duct flow*, Theoretical and Applied Mechanics 44(1) (2017), 83-101. (ESCI, Q4 – Mechanics, IF=0,7)
3) I. Pažanin, M. Radulović, *Asymptotic approximation of the nonsteady micropolar fluid flow through a circular pipe*, Mathematical Problems in Engineering, Volume 2018 (2018), Article ID 6759876, 16 pages (CC, SCIE, Q3 – Mathematics, Interdisciplinary Applications, IF=1,430, 2021).
4) M. Beneš, I. Pažanin, M. Radulović, *Existence and uniqueness of the generalized Poiseuille solution for nonstationary micropolar flow in an infinite cylinder*, Electronic Journal of Differential Equations, Vol 2018 (2018), No. 148, issn:1072-6691, pp. 1-26. (CC, SCIE, Q2 – Mathematics, IF=0,8)
5) M. Beneš, I. Pažanin, M. Radulović, *Rigorous derivation of the asymptotic model describing a nonsteady micropolar fluid flow through a thin pipe*, Computers & Mathematics with Applications 76(9) (2018), 2035-2060. (CC, SCIE, Q1 – Mathematics, Applied, IF=2,7)

6) I. Pažanin, M. Radulović, *Asymptotic analysis of the nonsteady micropolar fluid flow through a curved pipe*, Applicable Analysis 99(12) (2020), 2045-2092. (CC, SCIE, Q2 – Mathematics, Applied, IF=1,2)
7) E. Marušić-Paloka, I. Pažanin, M. Radulović, *On the Darcy-Brinkman-Boussinesq flow in a thin channel with irregularities*, Transport in Porous Media 131(2) (2020), 633-660. (CC, SCIE, Q3 – Engineering, Chemical, IF=2,7)
8) M. Beneš, I. Pažanin, M. Radulović, *Leray's problem for the nonstationary micropolar fluid flow*, Mediterranean Journal of Mathematics 17, 50 (2020), pp. 1-32. (CC, SCIE, Q1 – Mathematics, IF=1,2)
9) E. Marušić-Paloka, I. Pažanin, M. Radulović, *Justification of the higher-order effective model describing the lubrication of a rotating shaft with micropolar fluid*, Symmetry 2020, 12(3), 334, in Special Issue: Recent Advances in Micropolar Fluids, G. Lukaszewicz, P. Kalita (Eds.) (2020), pp. 1-21. (CC, SCIE, Q2 – Multidisciplinary sciences, IF=2,2)
10) I. Pažanin, M. Radulović, *On the heat flow through a porous tube filled with incompressible viscous fluid*, Zeitschrift für Naturforschung A 75(4) (2020), 333–342. (CC, SCIE, Q3 – Physics, Multidisciplinary, IF=1,7)
11) I. Pažanin, M. Radulović, *Effects of the viscous dissipation on the Darcy-Brinkman flow: Rigorous derivation of the higher-order asymptotic model*, Applied Mathematics and Computation 386 (2020), Article ID 125479, pp. 1-12. (CC, SCIE, Q1 – Mathematics, Applied, IF=3,2)
12) G. Lukaszewicz, I. Pažanin, M. Radulović, *Asymptotic analysis of the thermomicropolar fluid flow through a thin channel with cooling*, Applicable Analysis 101(9) (2022), 3141-3169. (CC, SCIE, Q2 – Mathematics, Applied, IF=1,2)
13) M. Beneš, I. Pažanin, M. Radulović, *On viscous incompressible flows of nonsymmetric fluids with mixed boundary conditions*, Nonlinear Analysis: Real World Applications 64 (2022), Article ID 103424, pp. 1-21. (CC, SCIE, Q2 – Mathematics, Applied, IF=1,8)
14) M. Beneš, I. Pažanin, M. Radulović, B. Rukavina, *Nonzero boundary condition for the unsteady micropolar pipe flow: well-posedness and asymptotics*, Applied Mathematics and Computation 427 (2022), Article ID 127184, pp. 1-22. (CC, SCIE, Q1 – Mathematics, Applied, IF=3,2)
15) E. Marušić-Paloka, I. Pažanin, M. Radulović, *MHD flow through a perturbed channel filled with a porous medium*, Bulletin of the Malaysian Mathematical Sciences Society 45 (2022), 2441-2471. (SCIE, Q1 – Mathematics, IF=1,2)
16) I. Pažanin, M. Radulović, B. Rukavina, *Rigorous derivation of the asymptotic model describing a steady thermomicropolar fluid flow through a curvilinear channel*, Zeitschrift fur Angewandte Mathematik und Physik 73, 195 (2022), pp. 1-25. (CC, SCIE, Q1 – Mathematics, Applied, IF=1,9)
17) I. Pažanin, M. Radulović, *On the Forchheimer-extended Darcy-Brinkman flow through a thin fracture*, Zeitschrift für Angewandte Mathematik und Mechanik 104, 3 (2024), pp. 1-16. (CC, SCIE, Q1 – Mathematics, Applied, IF=3,7)

18) E. Marušić-Paloka, I. Pažanin, M. Radulović, *Analytical solution for the magnetohydrodynamic duct flow with slip condition on the perturbed boundary*, Chinese Journal of Physics 88 (2024), 425-438. (CC, SCIE, Q1 – Physics, Multidiscipinary, IF=5,3)
19) I. Pažanin, M. Radulović, B. Rukavina, *Asymptotic analysis of the nonsteady micropolar fluid flow through a system of thin pipes*, Mathematical Methods in the Applied Sciences 47, 15 (2024), 12285-12320. (CC, SCIE, Q1 – Mathematics, Applied, IF=2,0)
20) I. Pažanin, M. Radulović, *Magnetic-induced effects on the fluid flow through a porous tube*, Zeitschrift für Naturforschung A 80(11) (2025), 1127–1136. (CC, SCIE, Q3 – Physics, Multidisciplinary, IF=1,7)
21) M. Radulović, K. Hajduk, L. Tolj, *Modelling of the Forchheimer-extended Darcy-Brinkman-Boussinesq flow through a thin channel*, Transport in Porous Media 152, 94 (2025), pp. 1-28. (CC, SCIE, Q3 – Engineering, Chemical, IF=2,7)

Proceedings papers

1. E. Marušić–Paloka. I. Pažanin, M. Radulović, *On the lubrication of a rotating shaft with incompressible micropolar fluid*, Proceedings of the Conference Topical Problems of Fluid Mechanics 2020, Prague / D. Šimurda, T. Bodnár (2020), doi: 10.14311/TPFM.2020.021, pp. 160-167.

Citations

1. Web of Science: 113, h-index=6
2. MathSciNet: 48, h-index=4
3. Scopus: 109, h-index=6
4. Google Scholar: 150, h-index=7

Invited talks

1. *Rigorous justification of the asymptotic model describing the nonsteady micropolar pipe flow*, Seminar Katedra Matematiky, Faculty of Civil Engineering, Czech Technical University in Prague, Czech Republic, 21.11.2017.
2. *On the Darcy–Brinkman–Boussinesq flow in a thin channel with irregularities*, Seminar Katedra Matematiky, Faculty of Civil Engineering, Czech Technical University in Prague, Czech Republic, 18.02.2020.
3. *Justification of the higher order model describing a rotating shaft filled with micropolar fluid*, Symposium on Difference & Differential Equations and Applications 2021, International Conference on Numerical Analysis and Applied Mathematics 2021, Sheraton Rhodes Resort, Rhodes, Greece, 21.09.2021.
4. *On the MHD flow through a perturbed channel filled with a porous medium*, 13th Americas Conference on Diff. Equations and Nonlinear Analysis and ICMC Summer Meeting on Differential Equations - 2023 Chapter in Thematic Session: Domain Perturbations, PDEs and Dynamics, Sao Carlos, Brazil, 01.02.2023.

5. *On the Forchheimer extended Darcy-Brinkman flow through a thin channel*, Seminar for Differential Equations, Institute of Mathematics, Polish Academy of Sciences, Warsaw, Poland, 26.02.2024.

Contributed talks and posters

1. *Flow of a micropolar fluid through a channel with small boundary perturbation*, Workshop Modern challenges in continuum mechanics, Faculty of Electrical Engineering and Computing, Zagreb, Croatia, 05.04.2017. (poster)
2. *Flow of a micropolar fluid through a channel with small boundary perturbation*, International Conference on Differential and Difference Equations and Applications 2017, Military Academy, Amadora, Portugal, 09.06.2017.
3. *Asymptotic analysis of a nonsteady micropolar fluid flow through a thin pipe*, Emerging Trends in Applied Mathematics and Mechanics 2018, Faculty of Mathematics and Computer Science, Jagiellonian University in Krakow, Poland, 21.06.2018.
4. *Rigorous derivation of a higher–order model describing the nonsteady flow of a micropolar fluid in a thin pipe*, Ninth Conference on Applied Mathematics and Scientific Computing, Solaris, Šibenik, Croatia, 18.09.2018.
5. *Asymptotic analysis of the nonsteady micropolar fluid flow in a curved pipe*, Equadiff 2019, Universiteit Leiden, Leiden, Netherlands, 08.07.2019.
6. *Rigorous justification of the asymptotic model describing a nonsteady micropolar fluid flow through a thin curved pipe*, Multiscale Modeling in Fluid Mechanics and Fluid–Structure Interaction, Vilnius, Lihtuania, 11.10.2019.
7. *On the lubrication of a rotating shaft with incompressible micropolar fluid*, Topical Problems of Fluid Mechanics 2020, Prague, Czech Republic, 19.02.2020.
8. *On the Darcy–Brinkman–Boussinesq flow through a thin channel with slightly perturbed boundary*, Tenth Conference on Applied Mathematics and Scientific Computing, Brijuni, Croatia, 14.09.2020.
9. *Rigorous derivation of the higher order model describing a rotating shaft filled with micropolar fluid*, Brijuni Applied Mathematics Workshop 2021, Brijuni, Croatia, 09.07.2021.
10. *Effects of the viscous dissipation on the Darcy-Brinkman flow*, Analysis, PDEs and Applications, Dubrovnik, Croatia, 24.06.2022.
11. *The effects of viscous dissipation on the Darcy-Brinkman flow*, Equadiff15, Brno, Czech Republic, 14.07.2022.
12. *Thermomicropolar fluid flow through a thin channel with cooling*, Sixth workshop on thin structures, Naples, Italy, 08.09.2023. (poster)
13. *Thermomicropolar fluid flow through a thin channel*, Multi–scale methods for reactive flow and transport in complex elastic media, Dubrovnik, Croatia, 21.03.2024.
14. *Flow of thermomicropolar fluid through a thin channel*, Equadiff 2024, Karlstad, Sweden, 10.06.2024.
15. *Forchheimer extended Darcy–Brinkman flow through a thin channel*, 12th Conference on Applied Mathematics and Scientific Computing, Dubrovnik, Croatia, 26.09.2024.

16. *Forchheimer extended Darcy–Brinkman flow through thin domains*, Fluids@PoliMi, Milan, Italy, 09.01.2025. (poster)
17. *On the Forchheimer–extended Darcy-Brinkman flow through thin domains*, 4th IMA Conference on Dense Granular Flows, Cambridge, UK, 24.06.2025. (poster)
18. *Multiphysical effects on the fluid flow through a porous tube*, CROX 2026, Split, Croatia, 28.09.2026.

Professional meetings

1. *Asimptotička analiza nestacionarnog toka mikropolarnog fluida u tankoj zakrivljenoj cijevi*, participation with presentation on the Symposium of doctoral students at the Faculty of Science, Zagreb, Croatia, 22.02.2019.

Projects

2026. – 2029. *Asymptotic modeling of boundary-value problems in fluid mechanics – AsModFM* (UIP-2026-8443), scientific project (Croatian Science Foundation), main investigator.

2025. – 2031. *Young Researchers' Career Developement Project – Training of new doctoral students* (Croatian Science Foundation), mentor.

2024. – 2030. *Young Researchers' Career Developement Project – Training of new doctoral students* (Croatian Science Foundation), mentor.

2023. – 2027. *Singular perturbation and asymptotic analysis of boundary value problems for partial differential equations – Asyan* (IP-2022-10-1091), scientific project (Croatian Science Foundation), investigator.

2020. – 2024. *Multiscale problems in fluid mechanics – MultiFM* (IP 2019–04–1140), scientific project (Croatian Science Foundation), investigator.

2018. – 2022. *Asymptotic analysis of the boundary value problems in continuum mechanics – AsAn* (IP 2018–01–2735), scientific project (Croatian Science Foundation), investigator.

2018. – 2020. *Development of the international graduate study programme of biomedical mathematics on Faculty of Science - BioMedMath*, European Social Fund (ESF), associate.

2016. – 2019. *Young Researchers' Career Development Project - Training of new doctoral students*, Croatian Science Foundation, PhD student

2014. – 2018. *Mathematical modeling and numerical simulations of processes in thin or porous domains– MaSiMo* (IP 2013-11-3955), scientific project (Croatian Science Foundation), investigator.

Scientific visits

1. Faculty of Civil Engineering, Czech Technical University in Prague, Czech Republic, 19.11.-25.11.2017.

2. Faculty of Civil Engineering, Czech Technical University in Prague, Czech Republic, 26.11.-01.12.2018.
3. Faculty of Civil Engineering, Czech Technical University in Prague, Czech Republic, 17.02–21.02.2020.
4. Departamento de Matemática Aplicada, Instituto de Matemática e Estatística, Universidade de São Paulo, Brazil, 03.02.–08.02.2023.
5. Institute of Mathematics, Polish Academy of Sciences, Warsaw, Poland, 25.02.–01.03.2024.
6. Mathematical Institute, University of Oxford, Oxford, UK, 05.–09.05.2025.
7. Mathematical Institute, University of Oxford, Oxford, UK, 19.04.-11.07.2026.

Organization of international conferences

1. *CROX 2026 - Croatia-Oxford Mathematical Biology Workshop*, University of Split, Croatia, 28.-29.09.2026., member of organizing committee.

Conference, workshop and summer school participation

1. CIME-CIRM Course on New Trends in Non-Newtonian Fluid Mechanics and Complex Flows, Levico Terme, Trento, Italy, 29.08.2016.-02.09.2016.
2. Workshop Modern challenges in continuum mechanics, Zagreb, Croatia, 03.04.2017.-06.04.2017.
3. International Conference on Differential and Difference Equations and Applications, Military Academy, Amadora, Portugal, 05.06.2017.-09.06.2017.
4. CIME-CIRM Course on Mathematical Analysis of the Navier-Stokes Equations: Foundations and Overview of Basic Open Problems, Cetraro (CS), Italy, 04.09.2017.-08.09.2017.
5. Emerging Trends in Applied Mathematics and Mechanics, Faculty of Mathematics and Computer Science, Jagiellonian University in Krakow, Poland, 18.06.2018.-22.06.2018.
6. Workshop on Calculus of Variations and Applications, Zagreb, Croatia, 03.09.2018.-07.09.2018.
7. Ninth Conference on Applied Mathematics and Scientific Computing, Solaris, Šibenik, Croatia, 17.09.2018.-20.09.2018.
8. Equadiff 2019, Universiteit Leiden, Leiden, Netherlands, 08.07.2019.–12.07.2019.
9. Multiscale Modeling in Fluid Mechanics and Fluid–Structure Interaction, Vilnius, Lihtuania, 07.10.2019.–11.10.2019.
10. Topical Problems of Fluid Mechanics, Prague, Czech Republic, 19.02.2020–21.02.2020.
11. Tenth Conference on Applied Mathematics and Scientific Computing, Brijuni, Croatia, 14.09.2020.–18.09.2020.
12. Brijuni Applied Mathematics Workshop 2021, Brijuni, Croatia, 04.07.2021.–10.07.2021.
13. International Conference on Numerical Analysis and Applied Mathematics 2021, Sheraton Rhodes Resort, Rodos, Greece, 20.09.2021.–26.09.2021.
14. Analysis, PDEs and Applications, Dubrovnik, Croatia, 19.06.2022.–24.06.2022.
15. Equadiff15, Brno, Czech Republic, 11.07.2022.–15.07.2022.

16. 13th Americas Conference on Diff. Equations and Nonlinear Analysis and ICMC Summer Meeting on Differential Equations, Sao Carlos, Brazil, 30.01.2023.–03.02.2023.
17. Sixth workshop on thin structures, Naples, Italy, 07.09.–09.09.2023.
18. Multi–scale methods for reactive flow and transport in complex elastic media, Dubrovnik, Croatia, 19.03.–22.03.2024.
19. Equadiff 2024, Karlstad, Sweden, 10.06.–14.06.2024.
20. 12th Conference on Applied Mathematics and Scientific Computing, Dubrovnik, Croatia, 23.09.–27.09.2024.
21. Fluids@PoliMi, Milan, Italy, 08.01.–10.01.2025.
22. 4th IMA Conference on Dense Granular Flows, Cambridge, UK, 23.06.-26.06.2025.
23. CROX 2026, Split, Hrvatska, 28.09.-29.09.2026.

Professional meetings

1. *Asimptotička analiza nestacionarnog toka mikropolarnog fluida u tankoj zakrivljenoj cijevi*, participation with presentation on the Symposium of doctoral students at the Faculty of Science, Zagreb, Croatia, 22.02.2019.

Awards

Award of the Faculty of Science for young scientists in 2019./20.

Review service for domestic, international journals and conference proceedings:

1. *Journal of Mathematical Fluid Mechanics* (CC, SCIE, Q2 – Mathematics, Applied, IF=1,5)
2. *SN Applied Sciences* (ESCI, Q2 – Multidisciplinary Sciences, IF=3,2)
3. *Archive of Applied Mechanics* (CC, SCIE, Q2 – Mechanics, IF=3,1)
4. *Journal of Mathematical Inequalities* (CC, SCIE, Q2 – Mathematics, IF=1,0)
5. *ICNAAM 2021 Proceedings* (AIP Conference Proceedings)
6. *Glasnik Matematički* (CC, SCIE, Q4 – Mathematics, IF=0,4)
7. *Acta mathematica Spalatensia. Series didactica* (stručni časopis)
8. *Hrvatski matematički elektronički časopis* (stručni časopis)
9. *Axioms* (CC, SCIE, Q2 – Mathematics, Applied, IF=1,5)
10. *Mathematical Reviews* (AMS)
11. *Mathematical Methods in the Applied Sciences* (CC, SCIE, Q1 – Mathematics, Applied, IF=2,0)
12. *The European Physical Journal Plus* (CC, SCIE, Q2 – Physics, Multidisciplinary, IF=2,9)
13. *Numerical Methods for Partial Differential Equations* (CC, SCIE, Q2 – Mathematics, Applied, IF=1,4)

Promotional videos

1. Participation in the promotional video for the Biomedical Mathematics Study Programme in English at the Deparment of Mathematics, Faculty of Science, University of Zagreb
2. Participation in the promotional video (in Croatian) for the Mathematics Study Programme at the Deparment of Mathematics, Faculty of Science, University of Zagreb

Administrative duties

2022. –2026.	Head of Integrated undergraduate and graduate university programmme in mathematics and physics education Department of Mathematics, Faculty of Science, University of Zagreb
2025. –2026.	Head of Undergraduate University Programme in Mathematics and Physics Education Department of Mathematics, Faculty of Science, University of Zagreb

Participation in professional projects

1. IRI S3 professional project *Development of an innovative platform for the prediction and prevention of hazardous events using mathematical modeling and simulation in a data-rich industrial environment (RivaMP)* in collaboration with the Faculty of Electrical Engineering and Computing and the company Notch (2026–2029.)

Membership of groups

1. Seminar for differential equations and numerical analysis (from 2015.)
2. Cro-Math-In (from 2021.)

Teaching materials

1. Teaching materials for the course Applied Mathematical Analysis
2. Teaching materials for the course Ordinary Differential Equations

Graduation Thesis Supervisorships

1. B. Vinković, *Mathematical modeling of reaction kinetics* (03.03.2023.)
2. N. Ritz, *Mathematical modeling with differential equations in economics* (27.09.2023.)
3. I. Janjatović, *Ordinary differential equations and applications* (27.09.2023.)
4. M. Rošić, *Mathematical modeling of the formation of structures in biological systems* (27.09.2023.)
5. L. Tolj, *Modeling tumor growth* (03.09.2024.)
6. M. Mihetec, *Mathematical modeling in teaching of mathematics* (27.09.2024.)
7. F. Vrljić, *Discrete models of financial markets* (27.09.2024.)
8. S. M. Prpić, *Stochastic calculus in financial mathematics* (26.02.2025.)
9. M. Lučić, *Credit risk modeling* (26.09.2025.)
10. L. Nikolić, *Interest rate modeling* (26.09.2025.)
11. M. Majić, *Mathematical modeling of infectious diseases* (26.09.2025.)

12. L. Horvat, *Portfolio optimization* (03.12.2025.)
13. M. Radovečki, *Statistical models for financial market* (04.03.2026.)
14. P. Valjak, *Quantitative modeling of credit riskT* (30.09.2026.)
15. D. Ratković Rajhvajn, *Modeliranje invazije tumora* (30.09.2026.)

Professional papers

1. M. Radulović, L. Tolj, *Modeliranje rasta tumora*, Osječki Matematički List 25 (2) (2025), 141-159.

Teaching (Department of Mathematics, Faculty of Science)

1. Applied Mathematical Analysis
2. Systems of Differential Equations
3. Dynamical Systems
4. Introduction to Mathematical Modelling
5. Computer Lab 2 (teaching programme)
6. Mathematical Analysis of Multiscale Problems in Fluid Mechanics (doctoral course)
7. Mathematical Modelling of Fluid Flow in Porous Media (doctoral course)
8. Asymptotic analysis of multiphysical effects in fluid mechanics (doctoral course)
9. Ordinary Differential Equations
10. Linear Algebra 2 (engineering programme)
11. Mathematical Analysis 1 (MF)
12. Mathematical Analysis 2 (MF)
13. Foundations of Mathematical Analysis
14. Differential and Integral Calculus 1
15. Methodology of Teaching Mathematics 2
16. Fundamentals of Algorithms
17. Principles of Mathematical Modelling (BioMedMath)
18. Numerical Methods (BioMedMath)
19. Introduction to Programming
20. Applied Programming

Languages

Croatian (maternal)
English (B-level)
French (A-level)

Computer skills

Windows, Linux/UNIX, C, C++, Matlab, FreeFem, LaTeX, Beamer, Mathematica