Curriculum Vitae

Vít Průša

Office address and personal data

Faculty of Mathematics and Physics
Charles University in Prague
Sokolovská 83
Praha 8 – Karlín
CZ 186 75, Czech Republic
Email: prusv@karlin.mff.cuni.cz

Gender: Male
Date of birth: 26th August 1980
Place of birth: Hradec Králové, Czech Republic
Citizenship: Czech Republic
Nationality: Czech

Education and longer scientific stays

4/2024–	Associate Professor, Mathematical Institute, Charles University, Prague, Czech Republic
4/2024	Habilitation, Charles University, Prague, Czech Republic Habilitation thesis: "Mechanics and thermodynamics of viscoelastic fluids"
1/2012–4/2024	Assistant Professor, Mathematical Institute, Charles University, Prague, Czech Republic
1/2009–12/2011	Junior Researcher, Nečas Center for Mathematical Modeling, Faculty of Mathematics and Physics, Charles University, Prague, Czech Republic
3/2009–11/2010	Postdoctoral Research Associate, Department of Mechanical Engineering, Texas A&M University, College Station, Texas, United States of America; Supervisor: K.R. Rajagopal
6/2006–12/2008	Postgraduate Assistant, Nečas Center for Mathematical Modeling, Faculty of Mathematics and Physics, Charles University, Prague, Czech Republic
9/2005–6/2006	Postgraduate Visiting Research Student, Department of Mathematics, Keele University, Keele, United Kingdom (student mobility scheme under the European Union Erasmus/Socrates II Programme); Supervisor: Jonathan Healey
9/2004–12/2008	PhD student at the Charles University in Prague, Faculty of Mathematics and Physics, Czech Republic (PhD study programme Mathematical and computer modelling) PhD thesis: *Analýza stability proudění ve válcové trubici* (Analysis of the stability of a flow in a circular pipe); defended on 19th December 2008; Supervisor: Prof. Ing. František Maršík, DrSc.
1998–2004	Charles University in Prague, Faculty of Mathematics and Physics, Czech Republic (MSc study programme Mathematical and computer modelling) MSc thesis: *Pulsační osově symetrické proudění nestlačitelné reologické tekutiny* (Pulsatile axially symmetric flow of incompressible rheological fluid, in Czech); Supervisor: Prof. Ing. František Maršík, DrSc.

Publications

For scientometric and other data please see my profile on Orcid (0000-0002-0264-9888), Web of Science (IZP-9387-2023), Scopus (16246417800), MathSciNet (806064), ResearchGate or Google Scholar.

Journals

D. Cichra, V. Průša, K. R. Rajagopal, C. Rodriguez, and M. Vejvoda. The conclusion that metamaterials could have negative mass is a consequence of improper constitutive characterization. *Math. Mech. Solids*, 0(0):10812865241308823, 2025. doi: 10.1177/10812865241308823. [In press.]

P. A. Gazca-Orozco, V. Průša, and K. Tůma. Numerical approximation of a thermodynamically complete rate-type model for the elastic–perfectly plastic response. *Z. Angew. Math. Mech.*, 104(2):e202300030, 2024. doi: 10.1002/zamm.202300030

D. Cichra, P. A. Gazca-Orozco, V. Průša, and K. Tůma. A thermodynamic framework for non-isothermal phenomenological models of isotropic Mullins effect. *Proc. R. Soc. A Math. Phys. Eng. Sci.*, 479(2272):20220614, 2023. doi: 10.1098/rspa.2022.0614

V. Průša and L. Trnka. Mechanical response of elastic materials with density dependent Young modulus. *Appl. Eng. Sci.*, 14:100126, 2023. doi: 10.1016/j.apples.2023.100126

V. Průša, K. R. Rajagopal, and A. Wineman. Pure bending of an elastic prismatic beam made of a material with density-dependent material parameters. *Math. Mech. Solids*, 28(8):1546–1558, 2022. doi: 10.1177/10812865221081519

M. Dostalík and V. Průša. Non-linear stability and non-equilibrium thermodynamics–there and back again. *J. Non-Equilib. Thermodyn.*, 47(2):205–215, 2022. doi: 10.1515/jnet-2021-0076

D. Pražák, V. Průša, and K. Tůma. A note on parametric resonance induced by a singular parameter modulation. *Int. J. Non-Linear Mech.*, 139:103893, 2022. doi: 10.1016/j.ijnonlinmec.2021.103893

M. Dostalík, V. Průša, and K. R. Rajagopal. Unconditional finite amplitude stability of a fluid in a mechanically isolated vessel with spatially non-uniform wall temperature. *Contin. Mech. Thermodyn.*, 33:515–543, 2021a. doi: 10.1007/s00161-020-00925-w

M. Dostalík, V. Průša, and J. Stein. Unconditional finite amplitude stability of a viscoelastic fluid in a mechanically isolated vessel with spatially non-uniform wall temperature. *Math. Comput. Simulat.*, 189:5–20, 2021b. doi: 10.1016/j.matcom.2020.05.009

M. Bulíček, J Málek, V. Průša, and E. Süli. On incompressible heat-conducting viscoelastic rate-type fluids with stress-diffusion and purely spherical elastic response. *SIAM J. Math. Anal.*, 53(4):3985–4030, 2021. doi: 10.1137/20M1384452

M. Dostalík, C. Matyska, and V. Průša. Weakly nonlinear analysis of Rayleigh–Bénard convection problem in extended Boussinesq approximation. *Appl. Math. Comput.*, 408:126374, 2021c. doi: 10.1016/j.amc.2021.126374

V. Průša and K. Tůma. Temperature field and heat generation at the tip of a cutout in a viscoelastic solid body undergoing loading. *Appl. Eng. Sci.*, 6:100054, 2021. doi: 10.1016/j.apples.2021.100054

V. Průša and K. R. Rajagopal. Implicit type constitutive relations for elastic solids and their use in the development of mathematical models for viscoelastic fluids. *Fluids*, 6(3), 2021. doi: 10.3390/fluids6030131

M. Dostalík, J. Málek, V. Průša, and E. Süli. A simple construction of a thermodynamically consistent mathematical model for non-isothermal flows of dilute compressible polymeric fluids. *Fluids*, 5(3):133, 2020. doi: 10.3390/fluids5030133

D. Cichra and V. Průša. A thermodynamic basis for implicit rate-type constitutive relations describing the inelastic response of solids undergoing finite deformation. *Math. Mech. Solids*, 25(12):2222–2230, 2020. doi: 10.1177/1081286520932205

J. Cehula and V. Průša. Computer modelling of origami-like structures made of light activated shape memory polymers. *Int. J. Eng. Sci.*, 150:103235, 2020. doi: 10.1016/j.ijengsci.2020.103235

V. Průša, K. R. Rajagopal, and K. Tůma. Gibbs free energy based representation formula within the context of implicit constitutive relations for elastic solids. *Int. J. Non-Linear Mech.*, 121:103433, 2020. doi: 10.1016/j.ijnonlinmec.2020.103433

M. Dostalík, V. Průša, and K. Tůma. Finite amplitude stability of internal steady flows of the Giesekus viscoelastic rate-type fluid. *Entropy*, 21(12), 2019. doi: 10.3390/e21121219

M. Bulíček, J. Málek, and V. Průša. Thermodynamics and stability of non-equilibrium steady states in open systems. *Entropy*, 21(7), 2019. doi: 10.3390/e21070704

A. Janečka, J. Málek, V. Průša, and G. Tierra. Numerical scheme for simulation of transient flows of non-newtonian fluids characterised by a non-monotone relation between the symmetric part of the velocity gradient and the Cauchy stress tensor. *Acta Mech.*, 230(3):729–747, 2019. doi: 10.1007/s00707-019-2372-y

K. Tůma, J. Stein, V. Průša, and E. Friedmann. Motion of the vitreous humour in a deforming eye–fluid-structure interaction between a nonlinear elastic solid and viscoleastic fluid. *Appl. Math. Comput.*, 335:50–64, 2018. doi: 10.1016/j.amc.2018.04.030

J. Málek, V. Průša, T. Skřivan, and E. Süli. Thermodynamics of viscoelastic rate-type fluids with stress diffusion. *Phys. Fluids*, 30(2):023101, 2018. doi: 10.1063/1.5018172

J. Hron, V. Miloš, V. Průša, O. Souček, and K. Tůma. On thermodynamics of viscoelastic rate type fluids with temperature dependent material coefficients. *Int. J. Non-Linear Mech.*, 95:193–208, 2017. doi: 10.1016/j.ijnonlinmec.2017.06.011

V. Průša, M. Řehoř, and K. Tůma. Colombeau algebra as a mathematical tool for investigating step load and step deformation of systems of nonlinear springs and dashpots. *Z. angew. Math. Phys.*, 68(1):1–13, 2017. doi: 10.1007/s00033-017-0768-x

M. Řehoř, V. Průša, and K. Tůma. On the response of nonlinear viscoelastic materials in creep and stress relaxation experiments in the lubricated squeeze flow setting. *Phys. Fluids*, 28(10):103102, 2016. doi: 10.1063/1.4964662

A. Janečka, V. Průša, and K. R. Rajagopal. Euler–Bernoulli type beam theory for elastic bodies with nonlinear response in the small strain range. *Arch. Mech.*, 68:3–25, 2016

V. Průša and K. R. Rajagopal. On the response of physical systems governed by nonlinear ordinary differential equations to step input. *Int. J. Non-Linear Mech.*, 81:207–221, 2016. doi: 10.1016/j.ijnonlinmec.2015.10.013

M. Řehoř and V. Průša. Squeeze flow of a piezoviscous fluid. *Appl. Math. Comput.*, 274(C):414–429, 2016. doi: 10.1016/j.amc.2015.11.008

Z. Yuan, V. Průša, K. R. Rajagopal, and A. Srinivasa. Vibrations of a lumped parameter mass–spring–dashpot system wherein the spring is described by a non-invertible elongation-force constitutive function. *Int. J. Non-Linear Mech.*, 76: 154–163, 2015. doi: 10.1016/j.ijnonlinmec.2015.06.009

T. Perlácová and V. Průša. Tensorial implicit constitutive relations in mechanics of incompressible non-Newtonian fluids. *J. Non-Newton. Fluid Mech.*, 216:13–21, 2015. doi: 10.1016/j.jnnfm.2014.12.006

O. Souček, V. Průša, J. Málek, and K. R. Rajagopal. On the natural structure of thermodynamic potentials and fluxes in the theory of chemically non-reacting binary mixtures. *Acta Mech.*, 225(11):3157–3186, 2014. doi: 10.1007/s00707-013-1038-4

A. Janečka and V. Průša. The motion of a piezoviscous fluid under a surface load. *Int. J. Non-Linear Mech.*, 60:23–32, 2014. doi: 10.1016/j.ijnonlinmec.2013.12.006

V. Průša and K. R. Rajagopal. On models for viscoelastic materials that are mechanically incompressible and thermally compressible or expansible and their Oberbeck–Boussinesq type approximations. *Math. Models Meth. Appl. Sci.*, 23(10): 1761–1794, 2013a. doi: 10.1142/S0218202513500516

V. Průša, K. R. Rajagopal, and U. Saravanan. Fidelity of the estimation of the deformation gradient from data deduced from the motion of markers placed on a body that is subject to an inhomogeneous deformation field. *J. Biomech. Eng.*, 135(8):081004, 2013. doi: 10.1115/1.4023629

V. Průša and K. R. Rajagopal. A note on the modelling of incompressible fluids with material moduli dependent on the mean normal stress. *Int. J. Non-Linear Mech.*, 52:41–45, 2013b. doi: 10.1016/j.ijnonlinmec.2013.01.003

V. Průša and K. R. Rajagopal. On implicit constitutive relations for materials with fading memory. *J. Non-Newton. Fluid Mech.*, 181–182:22–29, 2012a. doi: 10.1016/j.jnnfm.2012.06.004

V. Průša, K. R. Rajagopal, and S. Srinivasan. Role of pressure dependent viscosity in measurements with falling cylinder viscometer. *Int. J. Non-Linear Mech.*, 47(7):743–750, 2012. doi: 10.1016/j.ijnonlinmec.2012.02.001

V. Průša and K. R. Rajagopal. Flow of an electrorheological fluid between eccentric rotating cylinders. *Theor. Comput. Fluid Dyn.*, 26:1–21, 2012b. doi: 10.1007/s00162-011-0224-z

V. Průša and K. R. Rajagopal. A note on the decay of vortices in a viscous fluid. *Meccanica*, 46(4):875–880, 2011a. doi: 10.1007/s11012-010-9347-3

V. Průša and K. R. Rajagopal. Jump conditions in stress relaxation and creep experiments of Burgers type fluids: A study in the application of Colombeau algebra of generalized functions. *Z. angew. Math. Phys.*, 62(4):707–740, 2011b. doi: 10.1007/s00033-010-0109-9

S. Karra, V. Průša, and K. R. Rajagopal. On Maxwell fluids with relaxation time and viscosity depending on the pressure. *Int. J. Non-Linear Mech.*, 46(6):819–827, 2011. doi: 10.1016/j.ijnonlinmec.2011.02.013

J. Hron, J. Málek, V. Průša, and K. R. Rajagopal. Further remarks on simple flows of fluids with pressure-dependent viscosities. *Nonlinear Anal.-Real World Appl.*, 12(1):394–402, 2011. doi: 10.1016/j.nonrwa.2010.06.025

J. Málek, V. Průša, and K. R. Rajagopal. Generalizations of the Navier–Stokes fluid from a new perspective. *Int. J. Eng. Sci.*, 48(12):1907–1924, 2010. doi: 10.1016/j.ijengsci.2010.06.013

V. Průša. Revisiting Stokes first and second problems for fluids with pressure dependent viscosities. *Int. J. Eng. Sci.*, 48 (12):2054–2065, 2010. doi: 10.1016/j.ijengsci.2010.04.009

V. Průša. On the influence of boundary condition on stability of Hagen–Poiseuille flow. *Comput. Math. Appl.*, 57(5):763–771, 2009. doi: 10.1016/j.camwa.2008.09.043

V. Průša. Sufficient conditions for monotone linear stability of steady and oscillatory Hagen–Poiseuille flow. *SIAM J. Appl. Math.*, 67(2):354–363, 2007. doi: 10.1137/060652506

Chapters in collective volumes

V. Průša and K. R. Rajagopal. A new class of models to describe the response of electrorheological and other field dependent fluids. In H. Altenbach, J. Pouget, M. Rousseau, B. Collet, and T. Michelitsch, editors, *Generalized models and non-classical approaches in complex materials 1*, pages 655–673. Springer, 2018. doi: 10.1007/978-3-319-72440-9_35

J. Málek and V. Průša. Derivation of equations for continuum mechanics and thermodynamics of fluids. In Y. Giga and A. Novotný, editors, *Handbook of Mathematical Analysis in Mechanics of Viscous Fluids*, pages 1–70. Springer, 2017. doi: 10.1007/978-3-319-10151-4_1-1

Miscellaneous

M. Dostalík, V. Průša, and T. Skřivan. On diffusive variants of some classical viscoelastic rate-type models. *AIP Conference Proceedings*, 2107(1):020002, 2019. doi: 10.1063/1.5109493

M. Bulíček, J. Málek, V. Průša, and E. Süli. A PDE-analysis for a class of thermodynamically compatible viscoelastic rate type fluids with stress diffusion. In R. Danchin, R. Farwig, J. Neustupa, and P. Penel, editors, *Mathematical analysis in fluid mechanics: Selected recent results*, volume 710 of *Contemporary Mathematics*, pages 25–53. American Mathematical Society, 2018. doi: 10.1090/conm/710/14362

J. Stein and V. Průša. Viscoelastic rate type fluids with temperature dependent material parameters – stability of the rest state. *AIP Conference Proceedings*, 1843:020004, 2017. doi: 10.1063/1.4982979

K. V. Mohankumar, V. Průša, K. Kannan, and A. S. Wineman. Remarks on continuum theory of mixtures: Editorial to special issue on mixture theory. *Int. J. Adv. Eng. Sci. Appl. Math.*, pages 1–15, 2017. doi: 10.1007/s12572-017-0185-6

A. Janečka and V. Průša. Perspectives on using implicit type constitutive relations in the modelling of the behaviour of non-newtonian fluids. *AIP Conference Proceedings*, 1662:020003, 2015. doi: 10.1063/1.4918873

V. Průša. Tuhé a tekuté: možnosti a meze matematického modelování v mechanice kontinua. In Antonín Slavík, editor, *Matematika a reálný svět*, pages 56–61. Katedra didaktiky matematiky MFF UK, 2013. Sborník konference Matematika a reálný svět

V. Průša and J. Málek. Nejdéle trvající vědecký experiment a jeho poselství pro mechaniku kontinua. *Vesmír*, 91:502–504, 2012

J. Málek, V. Průša, and K. R. Rajagopal, editors. *Reviews in geomechanics*, volume 3 of *Lecture Notes of Jindrich Nečas Center for Mathematical Modeling*. Matfyzpress, 2007

P. Krejčí, J. Málek, and V. Průša. Special issue dedicated to Professor K. R. Rajagopal. *Appl. Math.*, 56(1):1–6, 2011. doi: 10.1007/s10492-011-0006-3

Grants awarded

2024–2029	senior team member, UNCE 24/SCI/005, University Centre for Mathematical Modelling, Applied Analysis and Computational Mathematics ("Univerzitní centrum matematického modelování, aplikované analýzy a výpočtové matematiky"), Charles University, principal investigator Josef Málek
2020–2024	team member, Czech Science Foundation, EXPRO 20-11027X "Mathematical analysis of partial differential equations describing far-from-equilibrium open systems in continuum thermodynamics", principal investigator Miroslav Bulíček
2018–2023	senior team member, UNCE/SCI/023, University Centre for Mathematical Modelling, Applied Analysis and Computational Mathematics ("Univerzitní centrum matematického modelování, aplikované analýzy a výpočtové matematiky"), University Centre of Excellence, Charles University, principal investigator Josef Málek
2018–2020	team member, Czech Science Foundation 18-12719S "Thermodynamical and mathematical analysis of complex fluids" ("Termodynamická a matematická analýza proudění strukturovaných tekutin") , principal investigator Josef Málek
2012–2017	team member, ERC-CZ LL1202 "Implicitly constituted material models: From theory through model reduction to efficient numerical methods" ("Materiály s implicitními konstitutivními vztahy: Od teorie přes redukci modelů k efektivním numerickým metodám"), principal investigator Josef Málek

2012–2017	junior team member, UNCE 204014/304014/2012, University Centre for Mathematical Modelling, Applied Analysis and Computational Mathematics ("Univerzitní centrum matematického modelování, aplikované analýzy a výpočtové matematiky"), University Centre of Excellence, Charles University, principal investigator Josef Málek
2012–2014	principal investigator, postdoctoral research grant, Czech Science Foundation P101/12/P074 "Behaviour of incompressible fluid-like materials with pressure dependent material moduli" ("Chování nestlačitelných materiálů tekutinového typu s tlakově závislými materiálovými koeficienty"); total funding CZK 920 000 (36 800 €)
2005–2006	team member, student research grant, Grant Agency of the Charles University GAUK 6/2005/R "Nonlinear models in continuum mechanics" ("Nelineární modely mechaniky kontinua"), principal investigator Martin Lanzendörfer

Scientific activities

2/2025	research stay (four days, 9th February – 12th February 2025), Department of Mathematics, University of North Carolina at Chapel Hill, Chapel Hill, USA; Host: Casey Rodrigues
2/2025	talk "Effective models for mechanical response of metamaterials", Mixtures: Modeling, analysis and computing, Prague, Czech Republic, 5th February – 7th February, 2025
9/2024	talk "Negative thoughts on negative mass", Prague School of Non-Equilibrium Thermodynamics, Prague, Czech Republic, 19th September – 20th September, 2024
7/2023	poster "Gibbs free energy based constitutive relations for elastic solids and their use in mathematical modelling of viscoelastic fluids", Novel Trends in Rheology IX, Zlín, Czech Republic, 26th July – 27th July, 2023
6/2023	talk "Thermodynamics of inelastic phenomena in solids – plasticity and Mullins effect", Joint European Thermodynamics Conference 2023, Salerno, Italy, 12th June – 17th June, 2023
6/2023	talk "Nonlinear stability and non-quilibrium thermodynamics – There and back again", The 13th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Wilmington, USA, 31st May – 4th June, 2023
5/2023	research stay (one month, 26th April–26th May 2023), Dipartimento di Matematica e Informatica "Ulisse Dini", Università degli Studi di Firenze, Italy; Host: A. Farina
2/2023	talk "A thermodynamic framework for non-isothermal phenomenological models of Mullins effect", SIAM Conference on Computational Science and Engineering (CSE23), Amsterdam, Netherlands, 26th February – 3rd March, 2023
7/2022	keynote talk "Non-linear stability and non-equilibrium thermodynamics – There and back again", EQUADIFF 15, Brno, Czech Republic, 11th – 15th July 2022
6/2022	research stay (one week), Department of Mechanical Engineering, Texas A&M University, College Station, Texas, United States of America; Host: K.R. Rajagopal
6/2021	talk "Thermodynamics of viscoelastic rate-type fluids and its implications for stability analysis", 8th European Congress of Mathematics, Portorož, Slovenia, 20th – 26th June 2021
6/2021	talk "Thermodynamics and nonlinear stability analysis of steady states in thermodynamically open systems", Joint European Thermodynamics Conference 2021, Prague, Czech Republic, 14th – 18th June 2021
11/2020	invited talk "Thermodynamics of viscoelastic rate-type fluids and its implications for stability analysis", workshop Multiscale Models for Complex Fluids: Modeling and Analysis, Banff International Research Station for Mathematical Innovation and Discovery, Banff, Canada, 23rd – 27th November 2020
12/2019	research stay (one week) in the framework of 4EU+ Programme, Institut Jean Le Rond d'Alembert, Sorbonne Université, Paris, France, 25th – 29th December 2019; Host: Pierre-Yves Lagrée
9/2019	invited plenary talk "Thermodynamics of viscoelastic rate-type fluids and its implications for stability analysis", Modelling 2019, Olomouc, Czech Republic, 16th – 20th September, 2019
7/2019	invited talk "On diffusive variants of some classical viscoelastic rate-type models", Novel trends in rheology VIII, Zlín, Czech Republic, 30th – 31st July, 2019

5/2019 talk “Thermodynamics and its implications for stability analysis of steady states in thermodynamically open systems”, Conference to celebrate 80th jubilee of Miroslav Grmela, Praha, Czech Republic, 18th – 19th May 2019

2/2019 research stay (one week), Department of Mechanical Engineering, Texas A&M University, College Station, Texas, United States of America; Host: K.R. Rajagopal

1/2019 talk “Thermodynamics of viscoelastic rate-type fluids”, workshop Mathematics in high-performance computing, Heidelberg, Germany, 14th – 16th January 2019

11/2018 invited talk “Thermodynamics of viscoelastic rate-type fluids with/without stress diffusion”, Joint French-Czech mathematics meeting, INSA Lyon, France, 29th – 30th November 2018

3/2018 invited talk “Thermodynamics of complex fluids” in minisymposium Fluid dynamics, 3. gemeinsamen Jahrestagung der Deutschen Mathematiker-Vereinigung (DMV) und der Gesellschaft für Didaktik der Mathematik (GDM), Paderborn, Germany, 5th – 9th March 2018

7/2017 participant in Implicitly constituted materials: Modeling, Analysis and Computing, Roztoky u Prahy, Czech Republic, 31st July – 4th August, 2017, talk “On the response of physical systems governed by nonlinear ordinary differential equations to step input”

7/2017 participant in Novel trends in rheology VII, Zlín, Czech Republic, 26th – 27th July, 2017, poster “Viscoelastic rate type fluids with temperature dependent material parameters – stability of the rest state”, jointly with J. Stein

5/2017 invited talk “Constitutive relations and maximum rate of entropy production in non-equilibrium processes” in mynisymposium *Theories of nonequilibrium thermodynamics* (chair professor Vito Antonio Cimmelli), 14th Joint European Thermodynamics Conference, Budapest, Hungary, 21st – 25th May 2017

9/2016 talk “On the response of nonlinear viscoelastic materials in creep and stress relaxation experiments in lubricated squeeze flow setting”, The XVIIth International Congress on Rheology (ICR2016), Kyoto, Japan, 8th – 13th August 2016, jointly with Martin Řehoř and Karel Tůma (talk delivered by Martin Řehoř)

10/2015 invited talk “Towards mathematical description of creep and stress relaxation tests in the mechanics of nonlinear viscoelastic materials”, Indian Institute of Technology, Chennai, India, 20th – 24th October, 2015

9/2015 participant in Workshop on MOdel REduction, Plzeň, Czech Republic, 6th – 10th September, 2015

7/2015 participant in Novel trends in rheology VI, Zlín, Czech Republic, 28th – 29th July, 2015, poster “Perspectives on using implicit type constitutive relations in the modelling of the behaviour of non-Newtonian fluids”, jointly with A. Janečka

5/2015 participant in 13th International Seminar on Furnace Design, Operation and Process Simulation, Velké Karlovice, Czech Republic, 17th – 18th June, 2015

5/2015 research stay (two weeks), Department of Mechanical Engineering, Texas A&M University, College Station, Texas, United States of America; Host: K.R. Rajagopal

9/2014 participant in conference “Modeling, analysis and computing in nonlinear partial differential equations”, Liblice, Czech Republic, 21st – 26th September, 2014, talk “Tensorial implicit constitutive relations in mechanics of incompressible non-Newtonian fluids”

6/2014 participant in ECMI 2014, 18th European Conference on Mathematics for Industry, Taormina, Italy, 9th – 13th June, 2014, invited talk “Mathematical modeling of float glass forming process” in mini-symposium “Model reduction in continuum thermodynamics”

2/2014 participant in workshop “Modeling and Simulation of the Cardiovascular System”, University of Heidelberg, Heidelberg, Germany, 10th – 12th February, 2014

2/2014 research stay (one week), Department of Mechanical Engineering, Texas A&M University, College Station, Texas, United States of America; Host: K.R. Rajagopal

11/2013 participant in workshop “Implicitly constituted materials: Modeling, analysis, and computing”, Liblice, Czech Republic, 24th – 27th November, 2013, talk “On implicit constitutive relations in continuum mechanics and thermodynamics”

7/2013 participant in BIFD 2013 (Bifurcations and Instabilities in Fluid Dynamics), Technion – Israel Institute of Technology, Haifa, Israel, 8th – 11th July, 2013, talk "On models for fluid-like materials that are mechanically incompressible and thermally compressible or expansible and their Oberbeck–Boussinesq type approximations"

6/2013 participant in the intensive programme Fluid2Bio "If Fluid Dynamics Turns to Biology", University of l'Aquila, l'Aquila, Italy, 24th June – 5th July, 2013, invited series of lectures "A continuum mechanics and thermodynamics primer"

5/2013 participant in the school *Mathematical Theory in Fluid Mechanics, Thirteenth School*, Kácov, Czech Republic, 24th May – 31st May, 2013

2/2013 participant in "Den s fyzikou" (Day with physics), Prague, Czech Republic, 7th February 2013, invited talk "Teplo, nevratnost a čas" (Heat, irreversibility and time)

9/2012 participant in "Matematika a reálný svět" (Mathematics and real world; a conference focused on keeping high school teachers in touch with achievements in modern mathematics), Prague, Czech Republic, 20th – 22nd September 2012, invited talk "Tuhé a tekuté: Možnosti a meze matematického modelování v mechanice kontinua" (Solid and liquid: Opportunities and limits of mathematical modelling in continuum mechanics)

9/2012 participant in DMV (Deutsche Mathematiker-Vereinigung) Annual Meeting 2012, Saarbrücken, Germany, 17th – 20th September 2012, invited talk "Implicitly constituted material models" in mini-symposium "Complex fluids"

8/2012–9/2012 research stay, Department of Mechanical Engineering, Texas A&M University, College Station, Texas, United States of America; Host: K.R. Rajagopal

7/2012 participant in the 6th European Congress of Mathematics, Kraków, Poland, 2nd – 7th July 2012, invited talk "An introduction to implicit constitutive theory to describe the response of continuous bodies" in mini-symposium "Implicitly constituted material models: Modeling and analysis"

6/2012 participant in the intensive programme Fluid2Bio "If Fluid Dynamics Turns to Biology", University of l'Aquila, l'Aquila, Italy, 3rd – 15th June, 2012, invited series of lectures "An introduction to fluid dynamics modelling"

3/2012 participant in the workshop *Challenges in analysis and modelling*, Prague, Czech Republic, 31st March, 2012, talk "Implicitly constituted materials with fading memory"

1/2012 participant in the *Seminář numerické analýzy a zimní škola – SNA'12*, Liberec, Czech Republic, 23rd – 27th January, 2012, invited talk "Implicit constitutive theory: from analysis through model reduction towards efficient numerical methods" (with Miroslav Bulíček, Jaroslav Hron and Josef Málek)

10/2011 participant in the *Workshop on multicomponent and multiphase materials*, Prague, Czech Republic, 6th – 7th October, 2011, talk "On a hierarchy of models in mixture theory" (with Ondřej Souček)

8/2011 participant in the school *Letní škola mechaniky tekutin 2011*, Liberec, Czech Republic, 29th August – 1st September, 2011

5/2011 participant in the school *Mathematical Theory in Fluid Mechanics, Twelfth School*, Kácov, Czech Republic, 27th May – 3rd June, 2011

12/2010 participant in the *Workshop on the occasion of 5th anniversary of the foundation of Jindřich Nečas Center for Mathematical Modeling*, 17th – 19th December, 2010, talk "Jump conditions in stress relaxation and creep experiments of Burgers type fluids"

11/2010 participant in *Perambulation of Continuum Mechanics* (a meeting in celebration of the sixtieth birthday of Professor K.R. Rajagopal), 11th – 13th November, 2010; invited speaker, talk "Jump conditions in stress relaxation and creep experiments of Burgers type fluids"

3/2010 participant in the workshop *Complex Fluid Dynamics*, IAMCS Workshops on Computational and Mathematical Challenges in Material Science and Engineering, King Abdullah University of Science and Technology, Jeddah, Saudi Arabia, 22nd – 25th March, 2010; invited plenary speaker, talk "Stability of steady and oscillating pipe flow"

2/2009 participant in the *International Winter School: Thermodynamics and Mathematical Analysis of Non-Newtonian Fluids*, Faculty of Mathematics, Informatics and Mechanics University of Warsaw, Korbielów, Poland, 7th – 13th February, 2009

12/2008	participant in the workshop *Mathematical Analysis of Fluid Models*, Nečas Center for Mathematical Modeling, Prague, Czech Republic, 10th – 13th December 2008
9/2008	participant in the *7th EUROMECH Fluid Mechanics Conference*, Manchester Institute of Mathematical Sciences, University of Manchester, Manchester, United Kingdom, 14th – 18th September, 2008; contributed talk "On the Influence of the Boundary Condition on Stability of Hagen–Poiseuille Flow", participation in the conference sponsored by EU Marie-Curie Scholarship
6/2008	participant in the *International Summer School on Evolution Equations EVEQ 2008*, Nečas Center for Mathematical Modeling & Institute of Mathematics of the Czech Academy of Sciences, Prague, Czech Republic, 16th – 20th June, 2008
6/2008	participant in CISM Summer School *Instabilities With and Without Heat Transfer and Chemical Reactions*, CISM (International Centre for Mechanical Sciences), Udine, Italy, 9th – 13th June, 2008
10/2007	participant in the workshop *International Workshop on Fluid-structure Interaction Problems*, Institute of Mathematics, Czech Academy of Sciences, Prague, Czech Republic, 30th October – 2nd November, 2007
10/2007	participant in the workshop *Analysis of Multiphase Problems*, Institute of Information Theory and Automation, Czech Academy of Sciences, Prague, Czech Republic, 8th – 12th October, 2007
9/2007	co-organizer and participant in *Workshop on Analysis of Evolutionary Partial Differential Equations in Fluids*, Faculty of Mathematics and Physics, Charles University, Prague, Czech Republic, 24th – 26th September, 2007
5/2007	participant in the school *Mathematical theory in fluid mechanics, Tenth School*, Paseky, Czech Republic, 11th May – 18th May, 2007
1/2005–12/2006	member of the research team of the grant *GAUK 6/2005/R Nelineární modely mechaniky kontinua* (GAUK 6/2005/R Grant agency of the Charles University, Nonlinear models in continuum mechanics)
11/2006	participant in the *Workshop Heidelberg-Prague 2006*, Faculty of Mathematics and Physics, Charles University, Prague, Czech Republic, 24th November – 25th November, 2006
9/2006	co-organizer and participant in the *Workshop on Geomaterials*, Faculty of Mathematics and Physics, Charles University, Prague, Czech Republic, 25th September – 27th September, 2006
4/2006	participant in the *British Applied Mathematics Colloquium*, Keele University, Keele, United Kingdom, 24th April – 27th April, 2006
7/2005	participant in the school *Mathematical theory in fluid mechanics, Ninth School*, Paseky, Czech Republic, 25th June – 1st July, 2005
9/2004	participant in the course *Nonlinear Waves in Fluids: Recent Advances and Modern Applications*, CISM (International Centre for Mechanical Sciences), Udine, Italy, 20th September – 24th September, 2004
2002–2003	member of the team of the grant *GAUK 261/2002 Klasická a moderní teorie parciálních diferenciálních rovnic* (GAUK 261/2002 Grant agency of the Charles University, Textbook: Classical and modern theory of partial differential equations)
7/2003	participant in the school *Mathematical Theory in Fluid Mechanics, Eight School*, Paseky, Czech Republic, 8th June – 14th June, 2003
2000–2002	member of the author team of the textbook *Výborný K., Zahradník M.: Používáme lineární alegebru, Karolinum, Praha, 2002* (Using linear algebra, in Czech)

Industrial cooperation

2018–2019	"Radiative heat transfer", Glass Service; radiative heat tranfer in glass production
2013–2017	"Mathematical modeling of float glass forming process", Glass Service; design and implementation of $2\frac{1}{2}$ dimensional model (thin film approximation) for the mathematical modelling of Pilkington process
2015	"Electrical impedance tomography of soft tissue", RS Dynamics; overview of basic mathematical methods for inverse problems in electrical impedance tomography

Academic cooperation – education

2014–	local administrator at Faculty of Mathematics and Physics, Charles University in Prague; ERASMUS+ programme with Dipartimento di Ingegneria e Scienze dell'Informazione e Matematica, Università degli Studi dell'Aquila, foreign coordinator Donatella Donatelli
2015	Memorandum of Understanding, Indian Institute of Technology Madras, Department of Civil Engineering and Department of Mechanical Engineering; foreign collaborators J. Murli Krishnan, Krishna Kannan, Atul Narayan
2024	Agreement of Cultural and Scientific Cooperation between the University of Florence and the Charles University in Prague; cooperation in the field of mathematics; foreign coordinator Lorenzo Fusi

Professional responsibilities

2012	member of organizing committee, EVEQ 2012 International Summer School on Evolution Equations, Prague, Czech Republic, 9th – 13th July, 2012
2006–2012	managing editor of Lecture notes series of the Nečas Center for Mathematical Modeling, Faculty of Mathematics and Physics, Charles University, Prague
2013–	administration (with Josef Málek) of the study programme Mathematical Modelling, Faculty of Mathematics and Physics, Charles University in Prague
2015–	member of Examination board, study programme physics, branch "Mathematical and Computational Modelling in Physics", Faculty of Mathematics and Physics, Charles University in Prague
2015–	member of Examination board, study programme mathematics, branch "Mathematical Modelling in Physics and Technology", Faculty of Mathematics and Physics, Charles University in Prague
2015	member of scientific committee, Workshop on model reduction, Pilsen, Czech Republic, 6th – 10th September, 2015
2016	guest editor, special issue on theory of mixtures, International Journal of Advances in Engineering Sciences and Applied Mathematics, jointly with Krishna Kannan and Alan Wineman
2019	co-organiser of minisymposium "Mathematical models and methods in phenomenological thermodynamics of continuous media", 9th International Congress on Industrial and Applied Mathematics (ICIAM 2019), 15th – 19th July 2019, Valencia, Spain (jointly with Sebastien Boyaval, Sergey Gavrilyuk, Josef Málek)
2020	co-organiser of doctoral school "Modelling and analysis in biomaterials", 8th - 14th February 2020 (jointly with Josef Málek, Anna Marciniak-Czochra, Michal Pavelka, Benoit Perthamme), 4EU programme
2022	organiser of minisymposium "PDE-09 Complex dynamical systems in continuum mechanics", Equadiff 15, 11th – 15th July 2022, Brno, Czech Republic
2024	co-organiser of conference Modelling, PDE analysis and computational mathematics in materials science, 22nd – 27th September 2024, Prague, Czech Republic
2025	co-organiser of conference Mixtures: Modeling, analysis and computing, 5th – 7th February 2025, Prague, Czech Republic
2025–	Vice-Chair, European Mathematical Society Topical Activity Group "Mixtures".

Editorial boards

5/2023–	International Journal of Engineering Science
1/2020–	Applications in Engineering Science

Reviewer for scientific journals

Applications of Mathematics, International Journal of Engineering Science, International Journal of Non-linear Mechanics, Applied Mathematics and Computation, Chemical Engineering Communications, Meccanica, Zeitschrift für Naturforschung A, International Journal of Thermal Sciences, Proceedings of Royal Society A – Mathematical, Physical & Engineering Sciences, Physics of Fluids, Acta Mechanica

Bachelor thesis supervisor

2013–2014 Tereza Perlácová, bachelor thesis "Mathematical models for incompressible non-newtonian fluids with non-monotone dependence of shear stress on shear rate", Faculty of Mathematics and Physics, Charles University, Prague

Results published as (Perlácová & Průša 2015, J. Non-Newton. Fluid Mech. 216, 13)

2014–2015 Marek Pšenka, bachelor thesis "Electrical impedance tomography of soft tissue", Faculty of Mathematics and Physics, Charles University, Prague

2016–2017 David Jiříček, bachelor thesis "On the response of nonlinear dynamical systems to step input", Faculty of Mathematics and Physics, Charles University, Prague

2016–2017 Martin Jurček, bachelor thesis "Spectrum of an operator chracterising the stability of the pipe flow", Faculty of Mathematics and Physics, Charles University, Prague

2018–2019 Jakub Cehula, bachelor thesis "Deformations of light activated shape memory polymers", Faculty of Mathematics and Physics, Charles University, Prague

Results published as (Cehula & Průša 2020, Int. J. Eng. Sci. 150, 103235)

2021–2022 Ladislav Trnka, bachelor thesis "Spectral collocation methods in solid mechanics", Faculty of Mathematics and Physics, Charles University, Prague

Master thesis supervisor

2010–2012 Martin Řehoř, diploma thesis "Behaviour of new types of material models in a squeeze flow geometry", Faculty of Mathematics and Physics, Charles University, Prague

Work "Behaviour of an incompressible fluid with pressure-dependent viscosity in a squeeze flow geometry" awarded by 1st place in SVOČ 2012 competition (student competition organized by Czech and Slovak mathematical societies) in section S10: Aplikovaná matematika – Matematické modely dynamiky (Applied mathematics – Mathematical models in dynamics)

Results published as (Řehoř & Průša 2016, Appl. Math. Comput. 274, 414)

2010–2012 Adam Janečka, diploma thesis "Motion of a fluid with pressure dependent material moduli under a surface load", Faculty of Mathematics and Physics, Charles University, Prague

Results published as (Janečka & Průša 2014, Int. J. Non-Linear Mech. 60, 23)

2011–2013 Stanislav Sláčik, diploma thesis "Motion of a body in a fluid with pressure dependent viscosity", Faculty of Mathematics and Physics, Charles University, Prague

2013–2014 Tomáš Chaloupka, diploma thesis "Mathematical modelling of glass forming process", Faculty of Mathematics and Physics, Charles University, Prague

2013–2016 Mark Dostalík, diploma thesis "Influence of material parameters on stability of thermal convection", Faculty of Mathematics and Physics, Charles University, Prague

Work "Influence of material parameters on stability of thermal convection" awarded by 1st place in SVOČ 2016 competition (student competition organized by Czech and Slovak mathematical societies) in section M8: Aplikovaná matematika – Matematické modely dynamiky (Applied mathematics – Mathematical models in dynamics)

Results partially published in (Dostalík *et al.* 2021, Appl. Math. Comput. 408, 126374)

2015–2016 Tomáš Skřivan, diploma thesis "Shear and vorticity banding", Faculty of Mathematics and Physics, Charles University, Prague

Results published as (Málek *et al.* 2018, Phys. Fluids 30, 023101) and (Dostalík *et al.* 2019, AIP Conference Proceedings 2107, 020002)

2017–2019 David Cichra, diploma thesis "Implicit constitutive relations in lower dimensional models in continuum mechanics", Faculty of Mathematics and Physics, Charles University, Prague

Results published as (Cichra & Průša 2020, Math. Mech. Solids)

2022–2023 Martin Vejvoda, diploma thesis "Matrix decompositions in constitutive relations for continuous medium", Faculty of Mathematics and Physics, Charles University, Prague

Doctoral thesis supervisor

2012–2018 Martin Řehoř, PhD thesis "Diffuse interface models in theory of interacting continua", Faculty of Mathematics and Physics, Charles University, Prague; defended on 27th September 2018

Co-tutelle PhD programme with Ruprecht-Karls-Universität Heidelberg, Heidelberg, Germany; German side supervisor Peter Bastian

2012–2018 Adam Janečka, PhD thesis "Implicitly constituted fluids and their flows in complicated geometries", Faculty of Mathematics and Physics, Charles University, Prague; defended on 23rd October 2018

Fulbright scholarship 2015/2016, Texas A&M University, College Station, Texas, United States of America; supervisor K.R. Rajagopal

2017–2021 Mark Dostalík, PhD thesis "Nonlinear stability of steady states in thermomechanics ofviscoelastic fluids", Faculty of Mathematics and Physics, Charles University, Prague; defended on 1st October 2021

2016–2022 Judith Stein, PhD thesis "Modeling of human vitreous as viscoelastic fluid considering the orientation of collagen fibers", Fachbereich Mathematik und Naturwissenschaften, Universität Kassel, Kassel; defended on 11th April 2022

co-supervisor, PhD study originally started in co-tutelle mode with Ruprecht-Karls-Universität Heidelberg, Heidelberg, Germany; German side supervisor Elfriede Friedmann

Teaching experience

summer 2021–2025 lecture Počítačové řešení fyzikálních úloh (Computer solution of problems in physics; numerical solution of dynamical problems in physics, Wolfram Mathematica, Matlab), jointly with Karel Tůma, Charles University, Prague, Czech Republic

summer 2022 tutorial on Matematická analýza (Mathematical analysis II; number series, power series, ordinary differential equations, functions of several variables), Charles University, Prague, Czech Republic

winter 2021 tutorial on Matematická analýza (Mathematical analysis I; introduction to mathematical analysis, calculus of one real variable), Charles University, Prague, Czech Republic

winter 2019 tutorial on Matematická analýza (Mathematical analysis I; introduction to mathematical analysis, calculus of one real variable), Charles University, Prague, Czech Republic

summer 2019 tutorial on Matematická analýza (Mathematical analysis II; number series, power series, ordinary differential equations, functions of several variables), Charles University, Prague, Czech Republic

winter 2018 tutorial on Matematika pro fyziky (Mathematics for physicists III; theory of distributions, partial differential equations), Charles University, Prague, Czech Republic

summer 2018 tutorial on Matematika pro fyziky (Mathematics for physicists II; complex analysis, Fourier series), Charles University, Prague, Czech Republic

winter 2017 tutorial on Matematika pro fyziky (Mathematics for physicists I; analysis on manifolds, variational calculus, Lebesgue integral), Charles University, Prague, Czech Republic

summer 2014–2025 lecture Klasické úlohy mechaniky kontinua (Classical problems in continuum mechanics; stability of shear flows, stability of thermal convection, elements of boundary layer theory, complex variable methods in linearised elasticity), Charles University, Prague, Czech Republic

winter 2012–2024 lecture Mechanika kontinua (Continuum mechanics; introduction to the mechanics of continuous media), Charles University, Prague, Czech Republic

winter 2011 tutorial on Mechanika kontinua (Continuum mechanics; introduction to the mechanics of continuous media), Charles University, Prague, Czech Republic

winter 2008 tutorial on Matematická analýza I (Mathematical analysis I; basics on differential and integral calculus), Charles University, Prague, Czech Republic

summer 2008 tutorial on Matematika pro fyziky (Mathematic for physicists III; complex analysis), Charles University, Prague, Czech Republic

winter 2007	tutorial on Matematika pro fyziky (Mathematic for physicists II; analysis on manifolds, variational calculus, Fourier series), Charles University, Prague, Czech Republic
winter 2006	tutorial on Matematická analýza I (Mathematical analysis I; calculus of one real variable), Charles University, Prague, Czech Republic
summer 2006	tutorial on Office Integration (Microsoft Office suite), Keele University, Keele, United Kingdom
summer 2006	tutorial on Dynamics (an introductory course on Newtonian mechanics of point particles), Keele University, Keele, United Kingdom
winter 2005	tutorial on Mathematical methods I (basic calculus), Keele University, Keele, United Kingdom
winter 2005	tutorial on Ordinary diferential equations (an introductory course on ordinary differential equations), Keele University, Keele, United Kingdom
summer 2005	tutorial on Matematika pro fyziky I (Mathematic for physicists I; calculus of several real variables), Charles University, Prague, Czech Republic
summer 2005	tutorial on Matematická analýza II (Mathematical analysis II; an introduction to the Lebesgue integral), Charles University, Prague, Czech Republic
winter 2004	tutorial on Matematická analýza I (Mathematical analysis I; calculus of one real variable), Charles University, Prague, Czech Republic

Language knowledge

Czech	native
English	good

References

These persons are familiar with my professional qualifications:

Prof. RNDr. Josef Málek, CSc.
Supervisor at Nečas Center for Mathematical Modeling

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Czech Republic
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K. R. Rajagopal
Supervisor during the stay at Texas A&M University

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Prague, February 27, 2025