Šárka Nečasová

Name: RNDr. Šárka Nečasová (Matušů), DSc.
Born: April 26, 1965; Prague, Czech Republic
Family situation: 3 children - Martin, Jan, Lucie

Researcher ID: D-5458-2014
Nationality: Czech

Education:
1988 - 1991 PhD student, Faculty of Mechanical Engineering, Czech Technical University in Prague, CSc. degree (PhD equivalent) 1991
1983 - 1988 Faculty of Mathematics and Physics, Charles University in Prague, RNDr. degree 1988

Academic Career:
2013 DSc. (Doctor of Sciences), Academy of Sciences of the Czech Republic
2010 Habilitation - Diriger des Recherches del'Université de Pau et des Pays de l'Adour (France)

Appointments and professional activities:
2010 - Head of the Department of Evolution Differential Equations, Institute of Mathematics, Czech Academy of Sciences
1995 - 2010 Researcher, Institute of Mathematics, Czech Academy of Sciences
1991 - 1995 Assistant Professor, Department of Mathematics, Faculty of Mechanical Engineering, Czech Technical University in Prague

Fellowships and Awards:
2021 Praemium Academiae - awarded by the Czech Academy of Sciences
2018 Giovanni Prodi Chair, University of Würzburg, Germany
2008 - 2015 each year one month Research fellow position in the Atomique Energie Commission C.E.A, Bruéres de Châtel, France
2003, 2006, 2007, 2010, 2014 visiting professor, Université de Pau et des Pays de l'Adour, France
2002, 2011 visiting professor, Université de Toulone et du Var, France
2003 Wichterle prize - awarded by the Czech Academy of Sciences
2000 one semester visiting professor position, University of Pittsburgh, USA
1999 one year research position, Institute Superior Tecnico, Lisbon, and CIM, Coimbra, Portugal (under supervision of Prof. Sequeira)
1998, 2 months research position, Northern Illionis University, USA
1993 - 1994 postdoctoral fellow, CNR, Department of Mathematics, University of Ferrara, Italy (invited by Prof. Padula and Prof. Galdi)

Supervision of Graduate Students and Postdoctoral Fellows:
Graduate students:
2019 -   Ana Radoševič, Charles University, Prague and University of Zagreb (double supervision)
2019 -   Jan Scherz, Charles University, Prague and University of Würzburg - consultant (double supervision)
2014 - 2016 Martin Kobera, Charles University, Prague
2013 - 2017 Matteo Caggio, West Bohemia University, Pilsen
Postdocs:
2020 - Arnab Roy, Czech Academy of Sciences
2019 - Amrita Ghosh, Czech Academy of Sciences
2016 - 2018 Tomoyuki Nakatsuka, Czech Academy of Sciences
2016 - 2018 Hind Al Baba, Czech Academy of Sciences

2008 - 2009 Aneta Wróblewska-Kamińska, Czech Academy of Sciences
2007 - 2008 Yuliya Namlyeyeva, Czech Academy of Sciences

Member of defence committe for the following PhD students abroad:

2020 Imene Djebour, Institut Élie Cartan de Lorraine, Université de Lorraine, France
2020 Srdjan Trifunovič, Shanghai Jiao Tong University, China
2019 Arthur J. Vromans, Karlstad University, Sweden
2018 Amrita Ghosh, Université de Pau et des Pays de l'Adour, France
2014 Mohamed Meslameni, Université de Pau et des Pays de l'Adour, France
2011 Hamid Bouzit, Université de Pau et des Pays de l'Adour, France

Teaching Activities:

2020 Introduction to the fluid-structure interaction, University of Hohai, Nanjing, China (online)
2019 - 2018 series of lectures addressed to master students, graduate students and to faculty members, University of West Bohemia, Pilsen
2018 courses - Introduction to the compressible fluids, Introduction to the fluid-structure interaction, University of Würzburg, Giovanni Prodi Chair position, Germany
2017 series of lectures addressed to graduate students and to faculty members, University of Zagreb, Croatia
2017 series of lectures addressed to graduate students and to faculty members, Tata Institute, India
2017 - Nečas Seminar on Continuum Mechanics with M. Feistauer, J. Haslinger, M. Kružík, Charles University, Prague
2015 - Seminar on Regularity of the Navier-Stokes equations, with M. Pokorný, Charles University, Prague
2008 - Mathematical modelling of bodies in viscous fluids, with M. Pokorný, P. Knobloch, Charles University, Prague
2006 - Seminar on Partial Differential Equations, with M. Pokorný, Charles University, Prague, and E. Feireisl, Institute of Mathematics, Czech Academy of Sciences
2000 calculus on algebra and mathematical analysis, University of Pittsburgh, USA
1991 - 1993, 1994 - 1995 exercises, lectures on Mathematical modelling of non-Newtonian fluids, Czech Technical University in Prague
1993 - 1994 series of lectures on Mathematical modelling of non-Newtonian fluids, University of Ferrara, Italy

One of the main organizers of scientific meetings:

2022 together with B. Muha (University of Zagreb), A. Schlömerkemper (University of Würzburg), J. Webster (University of Baltimore), minisymposium in the frame of SIAM-PDE, Berlin, in preparation
2021 together with A. Schlömerkemper (University of Würzburg), J. Webster (University of Baltimore), minisymposium in the frame of EMS, Portorož
2018 together with A. Schlömerkemper (University of Würzburg), A. Zarnescu (Basque Center for Applied Mathematics, Bilbao), G. Schimperna (University of Pavia), minisymposium, 12th AIMS Conference, Taipei, Twaivan
2016 together with B. Ducomet (University of Paris-Est) minisymposium in frame of EMS, Berlin
2012 together with R. Rautmann (University of Paderborn) and W. Varnhorn (University of Kassel), minisymposium AIMS conference, (2012, 2014, 2016, 2018)
2011 together with T. Bodnár (Czech Technical University) and G. P Galdi (University of Pittsburgh) series of summer schools (2011, 2012, 2014, 2016, 2018) https://prague-sum.com/
2007 together with R. Rautmann (University of Paderborn), V. S. Solonnikov (University of St. Petersburgh), J. Heywood (University of Vancouver), minisymposium in the framework of World Congress of Nonlinear Analysis

Institutional Responsibilities:

2017 - member of the Hiring and Evaluation Committee of the Institute of Information Theory and Automation, Czech Academy of Sciences

2017 - member of Doctoral Board Mathematics and Statistics, Masaryk University, Brno

2013 - alternating member of committe for defense of DSc., Mathematical analysis and related topics, Czech Academy of Sciences

2010 - Head of Department of Evolutionary Differential Equations, Institute of Mathematics of the Czech Academy of Sciences

2010 - Member of the Board of the Institute of Mathematics of the Czech Academy of Sciences, Prague

Commissions of trust:

2021 - member of Scientific Council of the Banach Centrum, Warsaw

2018 - Advisory panel "Science" at the Research and Development Council of the Government of the Czech Republic

2014 - Editor of the journal Differential Equations and Applications

2014 - Editor in series Atlantis Briefs in Differential Equations, Atlantis Press, together with M. Pokorný (Charles University) and Z. Došlá (Masaryk University)

2013 - Editor of the journal Discrete and Continuous Dynamical Systems - Series S

2012 - Jindřich Nečas, *Directed Methods in the Theory of Elliptic Equations* translated by G. Tronel and A. Kufner, editorial coordination by Š. Nečasová, contribution of C. Simader, Springer

2011 - guest editor together with T. Bodnár (Czech Technical University) and G. P. Galdi (University of Pittsburgh), Volumes of Lecture notes from summer schools, Advances in Mathematical Fluid Mechanics, Birkhäuser

International Cooperation:

Germany: University of Würzburg (2017 - 2019), University of Humbold, Berlin (2017), TH Darmstadt (2018, 2010 - 2016, 2005 - 2007, 1997, 1991), University of Mainz (2012 - 2016), University of Dresden (2011), University of Hamburg (2010), University of Heidelberg (2007), Weierstrass Institute (2006), University of Paderborn (2006), University of Kassel (2006), University of Stuttgart (2002)

Italy: University of L'Aquila (2018), University of Caserta (2014), University of Ferrara (1996, 1993,) University of Catania (1994), University of Palermo (1994), University of Milano (1994)

France: University of Toulon (2019, 2011 - 2014, 2002), University of Paris - Est (2016 - 2018), University of Pau (2018, 2017, 2014, 2010, 2003 - 2007), University of Toulouse (2018), University of Calais (2017), University of Chambery (2015), Atomique Energie Commission C.E.A, Bruéres de Châtel (2008-2015), University of Nancy (2003 - 2008), University of Metz (2005), Universite Marne la Valee (2002), Ecole Polytechnique, CMAP, Palaseau (2001)

UK: Oxford University (2013)

Portugal: Institute Superior Tecnico, Lisbon (2019, 2014, 2013, 2010, 2008, 2004, 1999, 1997), University of Coimbra (1999)

USA : University of Pittsburgh (2019, 2000, 1998), University of Oregon (2017, 2015), Tech. University of Virginia (2017), University of Columbus (2016), University of Austin (2015), Northern Illinois University (2002, 1998), Carnegie Mellon (2000)

China: University of Nanjing (2018, 2013), University Fudan, Shanghai (2017), University of Beijing (2016, 2013)

Korea: Chung-Ang University, Soul (2019)

Japan: Waseda University (2006, 1998)

Croatia: University of Zagreb (2019, 2018, 2017)

Poland: Institute of Mathematics, Polish Academy of Sciences (2019, 2015, 2011)

India: Tata Institute, Bangalore (2017)

Impact and Dissemination of work:

1 monograph, 7 chapters in monograph, 154 research articles, 1050 citations in Matscinet

International Recognition:

2019 Advisor of Justin Webster Eminent Scholar Program (University of Maryland)

2019 Plenary speaker, Evolution Equations, Abstract and Applied Perspectives, Luminy, CIRM *On a body with a cavity filled with compressible fluid*

2019 Plenary speaker, New trends in asymptotic methods for multiscale PDEs, Karlstad, *Singular limits in thin domains - Low Mach Number limits /An accretion disk*

2018 Plenary speaker, 18th Conference on Applied Mathematics and Scientific Computing Sibenic, Croatia, *On the problem of the motion of a rigid body with a cavity filled with a viscous compressible fluid*

2018 Keynote lecture in honor of Sir J. Ball Mathematical Philosophy in the 21st Century, Oxford Centre for Industrial and Applied Mathematics, Great Britain, *On the motion of a body with a cavity filled with compressible fluid*

2017 Series of 3 invited lectures, Modern challenges in continuum mechanics, Zagreb, *Navier - Stokes-(Fourier) system coupled to the radiative transfer equation*

2017 Würzburger Mathematisches Kolloquium, University of Würzburg, *Motion of fluids: applications in astrophysics, in medicine and in other areas*

2016 Plenary lecture, International Conference on Navier-Stokes equations and related PDEs: In honor of the 60th birthday of Professor Hi Jun Choe NIMS, Dajeon, Republic of Korea (June 2016) *Derivation of the Navier - Stokes (Fourier) - Poisson system for an accretion disk*

2015 Series of 2 invited lectures, University of Austin

2000 Series of 2 lectures, Carnegie Mellon

1998 Series of lectures, Northen Illinois University

1994 Series of lectures, University of Ferrara

During my professional career, I delivered more than 100 invited lectures at international conferences and delivered around 60 lectures at universities of scientific institutions. I am a regular visitor of University of Pau where I am giving talks for graduate students and faculty members. From 2017 I have a strong collaboration with University of Zagreb and University of Würzburg.

Memberships of Scientific Societies:

2018 - member of Learned Society of the Czech Republic

1996 - Union of the Czech Mathematicians and Physicists

1995 - member of Gesellschaft für Angewandte Mathematik und Mechanik

Ongoing grants:

Partial differential equations in mechanics and thermodynamics of fluids

Czech Science Foundation (GAČR), 2019-2021, Role - PI

Recent Track-record:

My recent research activities were focused on the problem of fluid-structure interaction. We solved the so-called Zukovski conjecture, Arch. Ration. Mech. Anal. 232 (2019), no. 3, 1649 – 1683 together with G. P. Galdi, V. Mácha. Moreover, we showed uniqueness result for the case of fluid-structure interaction when the solution satisfies the Serrin conditions, see J. Math. Fluid Mech. 23 (2021), no. 1 (together with B. Muha and A. Radoševič). Currently, I am finishing a monograph (with S. Kračmar, J. Neustupa and P. Penel) Mathematical theory of the fluid flow around a rotating and translating body, Springer Nature and I am working on Lecture Notes - Mathematical theory of compressible fluids on moving domains together with O. Kreml, V. Mácha, T. Piasecki and A. Wróblewska- Kamińska.

Selected papers and chapters in monograph:

X. Blanc, R. Danchin, B. Ducomet, : Š. Nečasová: The global existence issue for the compressible Euler system with Poisson or Helmholtz couplings. J. Hyperbolic Differ. Equ. 18 (2021), no. 1, 169 - 193.

B. Muha, Š. Nečasová, A. Radoševič: A uniqueness result for 3D incompressible fluid-rigid body interaction problem. J. Math. Fluid Mech. 23 (2021), no. 1, pp.39

G. P. Galdi, V. Mácha, Š. Nečasová: On the motion of a body with a cavity filled with compressible fluid. Arch. Ration. Mech. Anal. 232 (2019), no. 3, 1649 - 1683.

N. V. Chemetov, Š. Nečasová, B. Muha Weak-strong uniqueness for fluid-rigid body interaction problem with slip boundary condition. J. Math. Phys. 60 (2019), no. 1, 011505, 13 pp.

O. Kreml, V. Mácha, Š. Nečasová, A. A. Wróblewska-Kamińska Flow of heat conducting fluid in a time-dependent domain. Z. Angew. Math. Phys. 69 (2018), 5, 119, 27 pp.

E. Feireisl, V. Mácha, Š. Nečasová, M. Tucsnak Analysis of the adiabatic piston problem via methods of continuum mechanics. Ann. Inst. H. Poincaré Anal. Non Linéaire 35 (2018), 5, 1377–1408.

N. V. Chemetov, Š. Nečasová The motion of the rigid body in the viscous fluid including collisions. Global solvability result. Nonlinear Anal. Real World Appl. 34 (2017), 416–445.

P. Deuring, S. Kračmar, Š. Nečasová. Asymptotic structure of viscous incompressible flow around a rotating body, with nonvanishing flow field at infinity Z. Angew. Math. Phys. 68 (2017), no. 1, Art. 16, 15 pp.

C. Grandmont, M. M. Lukáčová - Medvidová, Š. Nečasová Mathematical and numerical analysis of some FSI problems. Fluid-structure interaction and biomedical applications, 1–77, Adv. Math. Fluid Mech., Birkhäuser/Springer, Basel, 2014.

B. Ducomet, Nečasová Š. Global smooth solution of the Cauchy problem for a model of a radiative flow, Annali della Scuola Normale Superiore di Pisa (5) 14 (2015), no. 1, 1–36.

E. Feireisl, O. Kreml, Š. Nečasová, J. Neustupa, J. Stebel. Incompressible limits of fluids excited by moving boundaries, SIAM J. Math. Anal. 46 (2014), no. 2, 1456—1471.

B. Ducomet, E. Feireisl, Š. Nečasová. *On a model in radiation hydrodynamics*, Annales de l'IHP Analyse Non Lineaire, **28**, 6, (2011), 797-812.

P. Deuring, S. Kračmar, Š. Nečasová. *On pointwise decay of linearized stationary incompressible viscous flow around rotating and translating bodies*, SIAM J. Math. Anal., 43, 2, (2011), 705–738.

D. Bucur, E. Feireisl, Š. Nečasová. *Boundary behavior of viscous fluids: Influence of wall roughness and friction-driven boundary conditions*, Arch. Rat. Mech. Anal., 197, 1, (2010), 117–138.

M. Okada, Š. Matušů - Nečasová, T. Makino. *Free boundary problem for the equations of one - dimensional motion of compressible gas with density-dependent viscosity*, Annali di Ferrara, Sez. VII - Sc. Mat., XLVIII, (2002), 99-108.

Š. Matušů - Nečasová, A. Novotný. *Measure-valued solution for non-Newtonian compressible isothermal monopolar fluid*, Acta Applicandae Mathematicae, 37, (1994), 109–128.

Monograph

Š. Nečasová, S. Kračmar: Navier-Stokes flow around a rotating obstacle. Mathematical analysis of its asymptotic behavior. Atlantis Briefs in Differential Equations, 3. Atlantis Press, Paris, 2016.

The monograph focused on the research during period 2008-2015 on the problem of fluid-structure interaction when the motion of the rigid body is prescribed. It is based on papers with S. Kračmar, R. Farwig and P. Deuring.

Selected invited lectures and presentations:

2021 Invited lecture, University of Nebraska-Lincoln, on-line

2021 Invited lecture, 8ECM, Portoroz, Slovenia -online

2020 Invited lecture, Mathflows, Poland

2020 Invited lecture, Turb1d2010, Lyon, France-online

2018 Invited lecture, Workshop on kinetic and fluid partial differential equations, Université Paris Descartes

2018 Series of 2 invited lectures, University of Nanjing, China

2018 Series of 2 invited lectures, University of Pau, France

2018 Series of 2 invited lectures, University of Oregon, USA

2017 Invited lecture Conference on Analysis of Classical Incompressible Fluids, Fudan University, China

2013 Invited lecture International Conference on the Mathematical Fluid Dynamics on the occasion of Prof. Shibata, University of Nara, Japan

2012 Invited lecture Model reduction in continuum thermodynamics: Modeling, analysis and computation, Banff, Canada

2011 Invited lecture International Conference on Mathematical Fluid Mechanics and Biomedical Applications, Conference in honor of Professor A. Sequeira, University of Azores, Ponta Delgada, Portugal
2007 Invited lecture, Mathematical Fluid Mechanics, Conference in honor of Professor G. P. Galdi, Estoril, Portugal
1994 Invited lecture, Third International Conference on Navier-Stokes equations and Related Nonlinear Problems, University of Madeira, Portugal