Biographical Sketch

Professor Renato Machado Cotta

Professor
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PERSONAL DATA

Born March 5th 1960, in Niterói, Rio de Janeiro, Brasil. Son of Enéas Machado Cotta and Claudette de Oliveira Cotta, both from Niterói, Brasil. Father of Bianca Pires Cotta, born in April 24th, 1984, in Rio de Janeiro, Brasil, Clara Naveira Cotta, born in February 12th, 2010, in Niteroi, Brasil, Gabriel Naveira Cotta, born in October 23rd, 2011, in Niteroi, Brasil, and step-father of Victor Naveira Figueiredo, born in December 12th, 2002, in Rio de Janeiro, Brasil. Married to Carolina Palma Naveira Cotta, born in March 31st, 1981.

PROFILE

Academic achievements combining advanced analytical techniques with experimental analysis, in both fundamental and applied research. Best known in the heat and mass transfer field for the hybrid approach mixing analytical, numerical and experimental methods in handling direct and inverse problems. Developed a problem reformulation strategy known as the Coupled Integral Equations Approach (CIEA), to yield simpler yet accurate lumped-differential formulations, a hybrid solution methodology known as the Generalized Integral Transforms Technique (GITT), to provide more cost effective, accurate and robust solutions of partial differential equations, and employed these ideas combined with intrusive and nonintrusive measurements and inverse problem analysis for both function and parametric identifications. Dedicated to improving accuracy and robustness in engineering analysis, with the perspective of marching together the analytical-computational developments and experimental verifications. Typical fundamental research areas are transient forced convection, conjugated problems, drying, micro-scale heat transfer, porous media, natural convection, boundary layer & Navier-Stokes eqs., phase-change, heat transfer enhancement, membrane distillation, nuclear heat transfer, metamaterials.

EDUCATION

1. B.Sc. – Mechanical Engineering (specialization in Nuclear Engineering) - Federal University of Rio de Janeiro (1977-1981). Final graduation project advised by Prof. Nilson C. Roberty on thermal analysis of nuclear fuel rods for PWR reactors.

2. On Job Training – Nuclear Engineering Institute, IEN/CNEN (1980-1981). Research, design and operational training on nuclear reactors thermohydraulics at the water and liquid sodium circuits, advised by Dr. Sergio V. Moller.

3. Ph.D. - Mechanical & Aerospace Engineering - North Carolina State University, Raleigh, USA (1982-1985). Minors in Nuclear Engineering and Mathematics. The thesis work was advised by Prof. M. Necati Ozisik and was centered on analytical and hybrid solutions for internal convective heat transfer in the three time regimen - steady, periodic and transient. Scholarship sponsored by the National Nuclear Energy Commission, CNEN/Brazil.

ACADEMIC/`PROFESSIONAL EXPERIENCE

Permanent Positions

1. 1984-1985 – Research Assistant, Mechanical & Aerospace Engineering Department, North Carolina State University, USA.
2. 1984-1985 – Teaching Assistant, Physics Department, North Carolina State University, USA.
3. 1986-1987 - Assistant Professor, Mechanical-Aeronautical Engineering Department, Aeronautics Institute of Technology, ITA/CTA, São José dos Campos, São Paulo, Brasil.
4. 1987-1994 - Associate Professor - Mechanical Engineering Department, PEM/COPPE (up to 1994) & DEM/POLI (up to 1997), Universidade Federal do Rio de Janeiro, UFRJ.
5. 1993-2005 - Adjunct Professor - Mechanical Engineering Dept., University of Miami, Coral Gables, FL, USA.
6. 1994–Present: Full Professor - Mechanical Engineering Department, PEM/COPPE (1994-Present) & DEM/POLI (1997-Present), UFRJ.
7. 2015-2017 - President, National Commission of Nuclear Energy (CNEN), Ministry of Science, Technology & Innovation, Brazil.
8. 2017 (Apr.-Dec.) - Senior Technical Consultant, Naval Agency for Nuclear Safety and Quality (AgNSNQ/DGDNTM,) Brazilian Navy, AMAZUL S.A., Ministry of Defense.
9. 2019-Present - Senior Technical Consultant, General Directorate for Nuclear and Technological Development, DGDNTM, Brazilian Navy, AMAZUL S.A., Ministry of Defense.

Visiting Professor/Researcher Positions

10. 1987 (Aug.-Dec.) – Visiting Technical Consultant – Navy Technology Center (COPESP, Brazilian Navy), São Paulo, Brazil.
11. 1989 (Jan.-Feb.) – Visiting Professor – Mechanical & Aerospace Eng. Dept., University of Miami, Coral Gables, USA.
12. 1989 (Aug.-Sept.) – Visiting Professor – Applied Mathematics Center, Sofia, Bulgaria.
13. 1992 (Jun.-Jul.) – Visiting Professor – Laboratorio di Ingenieria Nucleare di Montecuccolino, Universitá Degli Studi di Bologna, Italy.
14. 1999 (Jun.-Aug.) – Visiting Professor – Energy Resources Center, University of Illinois at Chicago, IL, USA
15. 2002 (Jan.-Mar.) – Visiting Researcher – Tetra Tech Inc., R&D Office, CA, USA
16. 2004 (Jan.) – Professeur Invité – Laboratoire FAST, Université de Paris XI, Orsay, France
17. 2004 (Feb.-Mar.) – Professeur Invité – Laboratoire de Thermomécanique, Université de Reims, Champagne-Ardennes, France
18. 2006 (Jan.-Mar.) – Professeur Invité – Laboratoire de Thermomécanique, Université de Reims, Champagne-Ardennes, France
19. 2008 (Jan.-Mar.) – Professeur Invité – Laboratoire de Thermomécanique, Université de Reims, Champagne-Ardennes, France
20. 2014 (Jun.-Jul.) – Visiting Professor – Harriot-Watt University, Scotland, UK.
21. 2017 (Dec.) – 2018 (Dec.) – Visiting Professor – Mechanical Eng. Dept., University College London, UCL, UK (Leverhulme Trust Visiting Professorship).
22. 2024 (Jan.-Feb.) – Visiting Researcher – Mechanical Eng. Dept., University of Maryland, USA.

ADMINISTRATION AND REPRESENTATION

External

1. Member of the National Council for Energy Policy (CNPE), Ministry of Mines and Energy, MME, Brasil, 2020-2022. CNPE, chaired by the Minister of State for Mines and Energy, is an advisory body to the President of the Republic for the formulation of energy policies and guidelines, formed by 14 members, including 10 State Ministries and 1 representative of the Brazilian Academia, specialist in the energy field. https://www.gov.br/mme/pt-br/assuntos/conselhos-e-comites/cnpe/composicao-do-cnpe
2. President, National Commission of Nuclear Energy (CNEN), nominated by the Ministry of Science, Technology & Innovation, Brazil, November 2015 - March 2017. CNEN is the regulatory agency in nuclear energy in Brazil, as well as a research consortium comprising 14 units, including 6 research institutes, and around 2200 employees. (www.cnen.gov.br)
3. Member of the Scientific and Technological Council of the state company Amazul Tecnologias de Defesa S.A., São Paulo, Brazil, since 2023.
4. Member of the Technical Working Group on Nuclear Desalination (TWG-ND), International Atomic Energy Agency (IAEA), Vienna, Austria, 2021-2025.

5. Founder and Coordinator of the Laboratory of Technologies for Sustainable Energies, LATES, Materials Technologies Group, Navy Research Institute, IPqM-CTMRJ, Rio de Janeiro, 2021-present.
6. Executive Directorate, Brazilian Academy of Sciences (ABC), responsible for administrative affairs of the Academy, supporting the proposition and organization of scientific meetings and events, March 2012 – November 2015. (www.abc.org.br)
7. President of the Administration Council of INB, Indústrias Nucleares do Brasil, MCTI, Rio de Janeiro, Brazil, 2015-2017. (www.inb.gov.br)
8. President of the Administration Council of NUCLEP, Nuclebrás Equipamentos Pesados S.A., MCTI, Rio de Janeiro, Brazil, 2015-2017. (www.nuclep.gov.br)
9. Member, Executive Committee of the Infrastructure Fund (CT-Infra, FNDCT), Ministry of Science, Technology & Innovation, MCTI, Brazil, 2012-2015.
10. Member of the Superior Council of FINEP, technology and innovation sponsoring agency of the Ministry of Science, Technology and Innovation, MCTI, Brazil, 2013-2015. (www.finep.gov.br)
11. President (Elected by members), Brazilian Society of Mechanical Sciences and Engineering, ABCM, 2000 & 2001. ABCM is a national scientific association responsible for the organization of major national and international scientific meetings within the country, as well as for publication of the Journal of the Brazilian Society of Mechanical Sciences and Engineering, Springer (www.abcm.org.br).
12. Member and Secretary, Thermal Sciences Committee, Brazilian Society of Mechanical Sciences and Engineering, ABCM, 1986-1992.
13. Member and Secretary, Nuclear Engineering Committee, Brazilian Society of Mechanical Sciences and Engineering, ABCM, 2019-2022.
14. Brazilian Delegate, Assembly for International Heat Transfer Conferences (AIHTC), 1992-2000.
15. Member and Coordinator, Consultants Committee (Engineering II), CNPq, 1994-1997, re-elected in 2007-2010. CNPq is the federal research sponsoring agency in Brazil, subjected to the Ministry of Science and Technology.
16. Member, Consultants Committee (Engineering III), CAPES, 1991-1994, re-elected in 1995-1998. CAPES is the federal research sponsoring agency and graduate programs evaluator in Brazil, subjected to the Ministry of Education.
17. Member, Special Commission for Evaluation of the National Postgraduate Program, CAPES, Ministry of Education, March-August, 2019.
18. Elected Member, Executive Committee of the International Center for Heat and Mass Transfer, ICHMT, Turkey, 2006-2022.
19. Elected Vice-Chairman, Executive Committee of the International Center for Heat and Mass Transfer, ICHMT, Turkey, 2016 and 2019. (https://www.ichmt.org/p/officers-of-ichmt)
20. Elected Chairman, Executive Committee of the International Center for Heat and Mass Transfer, ICHMT, Turkey, 2017-2018.
21. Member of the Superior Council of the Brazilian Space Agency (Alternate), AEB, since 2014. (www.aeb.gov.br)
22. Member of the Scientific Committee of the Brazilian Nanotechnology National Laboratory, LNNano, CNPEM, Campinas, SP, 2015.
23. Collaborator in the installation of the Polytechnic Institute of Nova Friburgo, IPRJ, Nova Friburgo, RJ, 1990-1991.

24. Head – Energy Department, Aeronautics Technology Institute, ITA-CTA, São José dos Campos, SP, 1987.

At UFRJ

1. Coordinator for Research and Graduate Studies, Dean´s Office, Technology Center, Federal University of Rio de Janeiro, CT-UFRJ, January 2012-July 2014. (www.ct.ufrj.br)
2. Member of Institutional Committee for the Project "Museu Nacional Vive", responsible for re-erecting the National Museum (UFRJ), nominated by the Brazilian Academy of Sciences, ABC, 2020-2022.
3. Graduate Coordinator, Mechanical Eng. Program, Universidade Federal do Rio de Janeiro, COPPE/UFRJ, 1991/93, 1998, 2000/2001 (www.mecanica.coppe.ufrj.br).
4. Head of the Heat Transmission & Technology Laboratory, LTTC, PEM/COPPE, 1993-1998, 2006-2012.
5. Co-Founder of the Laboratory of Nano and Microfluidics and Microsystems, LabMEMS, of COPPE-UFRJ, 2011.
6. Co-Founder and Collaborating Professor - Nanoengineering Department, COPPE/UFRJ, 2013 – 2017.
7. Co-Founder and Collaborating Professor - Interdisciplinary Nucleus for Social Development, NIDES/UFRJ, Technology Center – CT, 2014 – 2017.
8. Coordinator of International Cooperation, NIDES, Interdisciplinary Nucleus for Social Development, Technology Center, Federal University of Rio de Janeiro, CT-UFRJ, December 2014-November 2015. (www.nides.ufrj.br)
9. Founder and Head of the *Mathematica* Technical Center, MTC, Wolfram Research/COPPE, 1999-2003. MTC is an academic initiative co-sponsored by WRI, makers of the platform *Mathematica*, and based at COPPE/UFRJ.
10. Founder and Head of the Center for Analysis and Simulations on Environmental Engineering, CASEE, an international consortium composed of EPRI/USA (Electric Power Research Institute), Tetra Tech/USA (Environmental Engineering Consulting Co.), and COPPE/UFRJ, Brasil, since 2001. CASEE is an international agreement, among the three institutions, designed to bring together a research center, a major consulting company, and a locally based University, towards the merging of experiences in simulation of environmental problems due mainly to energy generation within Brasil (name changed to CASEE – Center for Analysis of Sustainable Energies and the Environment, in 2011).
11. Founder and Head of the Thermal Metrology Unit Prof. Roberto de Souza, UNIMET, of COPPE/UFRJ, 2002-2012. This academic unit of COPPE is responsible for services of temperature and pressure sensors calibration, as well as thermal properties determination research and consulting.
12. Founder and Head of the Computer Assisted Design and Education Laboratory, LEPAC, of POLI/UFRJ, 1988-2006. This academic unit of Mechanical Eng. Dept. of the Polytechnic School (DEM-POLI) is responsible for training and regular courses on computational methods and CAD-CAE applied to Mechanical Engineering.
13. Head – Thermal Engines Laboratory, Mechanical Eng. Dept., POLI-UFRJ, 1997.

CONSULTING EXPERIENCE

1. Research Consultant & Coordinator, IAE/CTA and AEB (Aerospace Technical Center & Brazilian Space Agency), since 1988. Four long-term research projects were contracted with the COPPETEC Foundation (UFRJ), for the aerothermodynamic and thermal protection analysis of space vehicles, including the thermal design of the SARA satellite for atmospheric reentry.
2. Research Consultant & Coordinator, CTM-SP (Navy Research Center, Brasil), since 1986. Three long-term research projects were established with COPPETEC towards the simulation and optimization of flow and isotopes separation in ultracentrifuges for uranium enrichment.
3. Research Consultant & Coordinator, National Commission of Nuclear Energy (CNEN, Brasil), since 1989. Five long-term projects were established with COPPETEC for the safety analysis of surface repositories for nuclear waste, including the analysis of accidental dispersion of radionuclides in the biosphere.
4. Research Consultant, "Thermal Design Review of the SCD-01 First Brazilian Satellite for Data Collection", National Institute of Space Research, INPE, 1988.
5. Research Consultant, "Fast Refueling of Natural Gas Vehicles", RENAULT Plateau de Recherche, Renault-France/COPPE, (Coord. Prof. Helcio Orlande), 2000-2002.
6. Research Consultant & Coordinator, Research & Development Center, CENPES/Petrobras, 2005. A project was established with COPPETEC for the thermal analysis of pipe-in-pipe insulation systems with active heating for ultra-deep petroleum exploration.
7. Research Consultant & Coordinator, Research & Development Center, CENPES/Petrobras, since 2006. Two projects were conducted through the COPPETEC Foundation, for the characterization and convection simulation of nanofluids for the utilization in the heat transfer enhancement of energy generation processes.
8. Research Consultant & Coordinator, Indústrias Nucleares do Brasil (INB, Brasil), since 2005. Three projects were concluded through COPPETEC for the safety assessment of the waste from uranium mining and milling, including the analysis of long-term dispersion of radionuclides in the geosphere and their impact on the biosphere, originated from the liquid waste ponds, from the solid waste repository and from the uranium leaching platform.
9. Coordinator, Design and Construction of Icing Wind Tunnel and Thermal Control of Aeronautical Velocity Sensors, FAPERJ and ATS4I, 2010-2015.
10. Research Consultant & Coordinator, Eletronuclear, Brasil, since 2013. One project concluded through COPPETEC for the design of passive cooling systems for the short (wet) term storage of spent nuclear fuel assemblies.
11. Research Consultant & Coordinator, Tenaris-CONFAB, Brasil, since 2013. One project concluded through COPPETEC for the design of a high pressure and low temperature facility for research on insulation systems for ultra-deep petroleum production.
12. Technical Consultant, Amazul S.A. and General Directorate for Nuclear and Technological Development, DGDNTM, Brazilian Navy, 2017. Collaboration in the creation of the Naval Agency for Nuclear Safety and Quality, and technical evaluation in the development of the Nuclear-electrical Generation Laboratory (LABGENE).

13. Technical Coordinator, Design and testing of desalination unit with direct contact membrane distillation with waste heat recovery (Aqua Vitae & DESSAL Projects), IPqM/Brazilian Navy, COPPE/UFRJ, CNEN, sponsored by PROCAD-DEFESA, FAPERJ, and CNPq, 2017-present.
14. Research Consultant, Research and Development of Micro Channel Heat Sinks for High Concentration Photovoltaic Cells with Recovery of Rejected Heat for Desalination, ANP Project, Petrogal Brasil S.A., COPPE/UFRJ (Coord. Profa. Carolina Cotta), 2020-2024. Four years project through COPPETEC for the design and demonstration of active cooling of HCPV panels with waste heat recovery in direct contact membrane distillation.
15. Research Consultant, Evaluation of Methodologies for Interpretation of the Relative Permeability Curves in Heterogeneous Porous Media, CENPES-Petrobras S.A., COPPE-UFRJ (Coord. Prof. Paulo Couto), 2022-present. Three years project to evaluate different experimental and theoretical techniques for characterization of heterogeneous rock formations in petroleum reservoirs.
16. Research Consultant, EnerGente Project: Development of a Distributed and Sustainable Polycogeneration System for Electricity, Desalinated Water and Hydrogen, ANP Project, Petrogal Brasil S.A., COPPE/UFRJ (Coord. Profa. Carolina Cotta), 2024-present. Three years project through COPPETEC for the design and demonstration of waste heat recovery from sustainable energy sources for the cogeneration of electricity, desalinated water, and hydrogen.
17. Research Consultant, Membrane Distillation for Hypersaline Produced Water Treatment, ANP Project, Qatar Energy and TOTAL, COPPE/UFRJ (Coord. Profa. Carolina Cotta), 2024-present. Three years project through COPPETEC for the design and demonstration of membrane distillation system for the treatment of hypersaline petroleum production water.

BOOKS

1. R.M. Cotta, Calpak-Computational Laboratory in Heat Transfer, Núcleo de Publicações, COPPE/UFRJ, 1988 (in Portuguese).
2. R.M. Cotta, Integral Transforms in Computational Heat and Fluid Flow, CRC Press, Boca Raton, USA, 1993. ISBN: 0849386659; eBook ISBN 9781003069065; doi: 10.1201/9781003069065
3. R.M. Cotta & M.D. Mikhailov, Heat Conduction: Lumped Analysis, Integral Transforms, Symbolic Computation, Wiley-Interscience, N.Y., 1997. ISBN: 0471956481
4. R.M. Cotta, The Integral Transform Method in Thermal-Fluid Sciences and Engineering, Begell House Inc., N.Y., 1998. ISBN: 1567001203
5. R.M. Cotta, L.S.B. Alves, and M.D. Mikhailov, Applied Numerical Analysis with Mathematica, MTC/WRI, Editora E-papers, 2001. ISBN: 858792222X
6. H.R.B. Orlande, O. Fudym, D. Maillet, and R.M. Cotta, Eds., "Thermal Measurements and Inverse Techniques", CRC Press, 2011. ISBN: 978-1-439-84555-4
7. R.M. Cotta, D.C. Knupp, and C.P. Naveira-Cotta, "Analytical Heat and Fluid Flow in Microchannels and Microsystems", Mechanical Eng. Series, Springer-Verlag, 2016. ISBN: 978-3-319-23311-6

8. M. Rebay, S. Kakaç, and R.M. Cotta, Eds., "Microscale and Nanoscale Convective Heat Transfer: Concepts, Analysis, and Applications", CRC Press, Boca Raton, FL, 2016. ISBN: 978-1-498-73630-5
9. M.N. Ozisik, H.R.B. Orlande, M.J. Colaço, and R.M. Cotta, "Finite Difference Methods in Heat Transfer", 2nd Edition, CRC Press, Boca Raton, FL, 2017. ISBN: 978-1-4822-4345-1
10. R.M. Cotta (Co-Editor), "Handbook of Thermal Science and Engineering", Section I - Heat Transfer Fundamentals, Eds. Francis A. Kulacki et al., Eds., vols.1-4, Springer, 2017. ISBN:978-3-319-26694-7

RESEARCH PROJECTS AND PUBLICATIONS

1. More than 600 documents in major journals, refereed conferences, books and chapters (full list found in ORCID http://orcid.org/0000-0003-0965-0811 and in CV Lattes: http://lattes.cnpq.br/2974805638656106)
2. Supervisor of 39 Ph.D. (36 completed, 3 in progress), 49M.Sc. (48 completed, 1 in progress), and 17 Posdoc´s (1 in progress).
3. Coordinator or Co-Principal Investigator, Sponsored Research Projects and Scholarship Programs (CNPq, CAPES, FAPERJ, FINEP, PRONEX, FUJB, FAPESP, COPESP, CENPES/Petrobras, INPE, IAE-CTA, Renault Brasil, INB, Eletronuclear, Tenaris/CONFAB, AEB, CTPETRO, ANP, EMBRAPII, British Council, NSF/CNPq, CAPES/COFECUB-France, CNPq/CNRS-France, CSF/CNPq, UK Newton Fund/CONFAP, INMETRO/CAPES, Leverhulme Trust - UK, CTMSP/Brazilian Navy, PROCAD-Defesa/CAPES, RAEng - Royal Academy of Engineering, PETROGAL-GALP, Qatar Energy, Total Energy, CNRS/LAAS-France), since 1986.
4. Patent No. INPI: BR 102019.001325-7, filed 23/01/2019, "Monolithic Microfluidic Device for Optimization of Chemical Reactions Not Involving Reagents or Solid Products", 2019.
5. Registered Software No. INPI 27100130790, UNIT 1D-M, Unified Integral Transforms, 2010
6. **Citations** – January 17th, 2025:
   - 12,663 citations in Google Scholar with h-index 53 (https://scholar.google.com/citations?hl=en&user=fdTa1UYAAAAJ&view_op=list_works);
   - 5,273 citations in Scopus with h-index 39 in 277 papers (+347 secondary documents) at Scopus Author ID: 7005409712;

DISTINCTIONS AND AWARDS

1. Luikov Medal 2022, International Centre for Heat and Mass Transfer, ICHMT, Ankara, Turkey, awarded at the 17th IHTC, Cape Town, South Africa, 2023. (Luikov Medal | ICHMT)
2. Doctor Honoris Causa, Université de Reims Champagne-Ardenne, URCA, France, 2018. (https://www.univ-reims.fr)
3. Leonardo Goldstein Jr. Prize, 3rd Edition, ABCM, Brazilian Association of Mechanical Sciences and Engineering, Brazil, 2023. (https://abcm.org.br/news/view/1477)

4. MAE Hall of Fame – North Carolina State University, 2024. (https://mae.ncsu.edu/2024-alumni-hall-of-fame/)
5. Member – The World Academy of Sciences, TWAS, Trieste, Italy, elected in 2012 (www.twas.org).
6. Member - Brazilian Academy of Sciences, ABC, Area: Engineering Sciences, elected in 2009. (www.abc.org.br)
7. Member - National Academy of Engineering, ANE, Brazil, elected in 2011. (www.ane.org.br)
8. Leverhulme Visiting Professorship – University College London, UK, 2017-2018. (https://www.leverhulme.ac.uk/visiting-professorships)
9. Fellowship Award, International Center for Heat and Mass Transfer, ICHMT, 2018. (https://www.ichmt.org/p/fellowship-award)
10. Member of the National Order of the Scientific Merit, Class Grã-Cruz, Presidência da República, Brazil, 2018.
11. Member of the National Order of the Naval Merit, Class Comendador, Presidência da República, Brazil, 2018.
12. Member of the National Order of the Scientific Merit, Class: Comendador, Presidência da República, Brazil, 2009.
13. ANP Technological Innovation Prize – Winner, with Petrogal Brasil, Coord. Profa. Carolina Naveira-Cotta, ANP – National Agency of Petroleum, Natural Gas, and Biofuels, 2024. (https://www.gov.br/anp/pt-br/assuntos/tecnologia-meio-ambiente/premio-anp-inovacao-tecnologica/premio-anp-de-inovacao-tecnologica-2024) .
14. Tier 1 Exceptional Talent Visa, UK Home Office, nominated by Royal Academy of Engineering, RAEng, 2017.
15. Nuclear Legacy Medal, R&D Category, ABDAN, Brazilian Association for the Development of Nuclear Activities, Brazil, 2023.
16. ANP Technological Innovation Prize – Finalist (3) with Petrogal Brasil, Coord. Profa. Carolina Naveira-Cotta, ANP – National Agency of Petroleum, Natural Gas, and Biofuels, 2023.
17. Listed by PLOS Biology Journal among the 100 thousand most influential scientists in the world (top 2%) for citations along career (from a total of 600 scientists in Brazilian institutions). Announced and celebrated at the University Council special session for 100 years of the Federal University of Rio de Janeiro, 2020.
18. October 2023 data-update for "Updated science-wide author databases of standardized citation indicators". The selection is based on the top 100,000 scientists by c-score. Cited on both career-long and single recent year impact (2022). Elsevier data repository.
19. Medal “Carneiro Fellipe”, National Commission of Nuclear Energy, CNEN, 2018.
20. Medal "Mérito Tamandaré", Brazilian Navy, Ministry of Defense, Brazil, 2016.
21. Hartnett-Irvine Award - International Center for Heat and Mass Transfer, ICHMT (best paper in 2015, Cotta, R.M., K.M. Lisboa, J.R.B. de Souza, A.A. Bigdoli, J.B.R. Loureiro, C.P. Naveira-Cotta, and A.P. Silva Freire, "Experimental-Theoretical Analysis of Conjugated Heat Transfer in Aeronautical Sensors and Structures with Anti-Icing Systems", awarded at CHT-17, Napoli, Italy, 2017. (https://www.ichmt.org/p/hartnett-irvine-award)
22. Hartnett-Irvine Award - International Center for Heat and Mass Transfer, ICHMT (best paper in 2009, J. Nunes, R. Cotta, M. Avelino, S. Kakac, "Conjugated Heat

Transfer in Microchannels", awarded at 14th IHTC, Washington, DC, 2010. (https://www.ichmt.org/p/hartnett-irvine-award)

23. Member, Scientific Council of the International Center for Heat and Mass Transfer, ICHMT, Turkey, since 1993. (https://www.ichmt.org/p/scientific-council)
24. Elected Member of Congress Committee - IUTAM, International Union of Theoretical and Applied Mechanics, 2010-2018 (two mandates). (www.iutam.org)
25. Outstanding Research Award, COPPE/UFRJ, 1999 (second year of this award).
26. Award "Honra ao Mérito", Navy Engineers Corps, Brazilian Navy, Ministry of Defense, Brazil, 2017.
27. Award "Submarinista Emérito", Submarines Force, Brazilian Navy, Ministry of Defense, Brazil, 2017.
28. Medal "Amigo da Marinha", Brazilian Navy, Ministry of Defense, Brazil, 2016.
29. FAPERJ (State of Rio de Janeiro Scientific Award) - Cientista do Nosso Estado, since 1999.
30. Research Productivity Fellowship. CNPq/Brazil, since 1986 (highest rank – Pesquisador 1A, since 1992).
31. Highly Commended Award Winner at the Literati Network Awards for Excellence 2008, article Gondim, R.R., E.N. Macedo, and R.M. Cotta, "Hybrid Solution for Transient Internal Convection with Axial Diffusion: Integral Transforms with Local Instantaneous Filtering", Int. J. Num. Meth. Heat & Fluid Flow, V.17, no.4, pp.405-417, 2007.
32. Highly Commended Award Winner at the Literati Network Awards for Excellence 2012, article Silva, R.L., C.A.C. Santos, J.N.N. Quaresma, and R.M. Cotta, "Integral Transforms Solution for Flow Development in Wavy-Wall Ducts", Int. J. Num. Meth. Heat & Fluid Flow, Vol. 21, no. 2, pp. 219-243, 2011.
33. "Highly Commended Award of the 2013/14 Emerald Engineering Outstanding Doctoral Research Award", Co-advisor, Dr. Diego Campos Knupp, 2014.
34. CAPES Thesis Prize (Co-Advisor) - Best DSc Engineering Thesis in Brazil, 2009 (Author: Carolina Palma Naveira Cotta).
35. CAPES Thesis Award - (Co-Advisor) - Menção Honrosa DSc Engineering Thesis in Brazil, 2013 (Author: Diego Campos Knupp).
36. ABCM-EMBRAER Thesis Prize (Co-Advisor) - Best MSc Mechanical Eng. Thesis in Brazil, 2010 (Author: Diego Campos Knupp).
37. ABCM-EMBRAER Prize (Advisor) - Best Graduation Project - Mechanical Eng. in Brazil, 2013 (Author: Kleber Marques Lisboa).
38. 2022 Oscar Niemeyer Prize (Co-advisor) - CREA/RJ - Best MSc Thesis - Mechanical Eng., 2022 (Author: Emerson Barbosa dos Anjos)
39. 2nd Oscar Niemeyer Prize (Co-advisor) - CREA/RJ - Best Graduation Project - Mechanical Eng., 2012 (Author: João Vitor Cabral Ayres)
40. Paraninfo, Graduate Engineering Courses, ITA, São José dos Campos, 2024.
41. Distinguished Professor, Student Body, Polytechnic School, POLI/UFRJ (1990-1991, every year from 1993 to 2012, and 2016). Elected Paraninfo in 2003-1, 2003-2, 2005-2, 2010, 2012, 2016, and Patrono in 2009, 2010, 2011.
42. Elected member, National Honor Society of Phi Kappa Phi, USA (1984).
43. STEP Award for Academic Excellence, ASME, USA (1984).
44. Who's Who in Science and Engineering (since 1997), Who's Who in the World (since 2000).

45. Handbook of Thermal Science and Engineering, “Top ten most downloaded books”, Engineering - Springer, 2019.

EDITORIAL EXPERIENCE

1. Founder and Editor-in-Chief, International journal “Hybrid Methods in Engineering”, Begell House Inc., NY (up to Vol.4, no.4), co-edited by Mikhail D. Mikhailov.
2. Regional Editor, International Journal of Thermophysical Properties Research (ex- High Temperatures, High Pressures), 2007-2017.
3. Associate Editor, Engineering Sciences, Annals of the Brazilian Academy of Sciences (AABC), 2013-2023.
4. Honorary Editorial Board, Int. Journal of Heat & Mass Transfer, since 1992.
5. Honorary Editorial Board, Int. Communications in Heat and Mass Transfer, since 1992.
6. Honorary Editorial Board, International Journal of Thermal Sciences, since 2000.
7. Honorary Editorial Board, International Journal for Numerical Methods in Heat and Fluid Flow, since 2001.
8. Honorary Editorial Board, Computational Thermal Sciences, since 2007.
9. Honorary Editorial Board, Waste and Biomass Valorization, since 2009.
10. Honorary Editorial Board, International Journal of Thermophysical Properties Research (ex- High Temperatures, High Pressures), since 2007
11. Honorary Editorial Board, Journal of the Brazilian Society of Mechanical Sciences, 1989-1992, 2000-2004.
12. Advisory Editorial Board, Journal of Engineering Physics and Thermophysics, JEPT, since 2023.
13. Editorial Committee, Journal of Aerospace Technology and Management, JATM, 2012-2016.
14. Int. Editorial Board, Journal of Heat and Mass Transfer Research, since 2018.
15. Int. Editorial Board, Journal of Computational & Applied Mechanics, since 2019.
16. Advisory Editorial Board, Advances in Heat Transfer Series, Computational Mechanics Publications, CMP, UK, since 1994.
17. Advisory Editorial Board, Mechanical Engineering Series, Springer, since 2016.

INTERNATIONAL COLABORATION

1. Visiting Scholar, University of Miami, USA (1989, 1994, 1996, 1998, 2001, 2002), Applied Mathematics Centre, Sofia, Bulgaria (1989), Universitá Degli Studi di Bologna, Italy (1992), University College of Swansea, UK (1992, 1994), Tetra Tech, Inc., Lafayette, CA, USA (2002), University of Illinois at Chicago, UIC (1999, 2001), Laboratoire FAST, Orsay, France (2004), Université de Reims, France (2004, 2006, 2008), Harriot-Watt University, Scotland, UK (2014), University College London, UK (2018), University of Maryland, USA (2023, 2024). This list includes only those technical visits of two weeks or longer.
2. International Cooperation Program, CNPq, “Automatic Solvers for Convection-Diffusion Problems Via Integral Transforms”, Prof. Mikhail D. Mikhailov (Mathematical Technical Center, Sofia, Bulgaria), 1990.

3. International Cooperation Project, “Covalidation of the Integral Transform and Finite Elements Methods in Thermal and Fluid Sciences”, British Council Link: COPPE/UFRJ – Univ. College of Swansea, with Prof. Roland Lewis, 1992-1995.
4. International Cooperation Project, “USA-Brazil Workshop on Thermal Sciences Research”, CNPq/NSF (International Cooperation COPPE/MUEC, Midwest Universities Energy Consortium, USA), with Prof. James P. Hartnett, 1993-1994.
5. International Cooperation Project, CNPq, “Mixed Computation in Engineering:- The Integral Transform Method with Mathematica”, Prof. Mikhail D. Mikhailov (Visiting Researcher Scholarship), 1995-1999.
6. International Cooperation Project, “Theoretical and Experimental Research on Transient Forced Convection with Application to Cooling of Electronic Equipment”, CNPq/NSF (UFRJ/UFPB/University of Miami), with Prof. Sadik Kakaç, 1996-2001.
7. International Cooperation Project, “Covalidation of the Integral Transform and Finite Volume Methods in Heat Transfer”, Projeto CAPES-COFECUB, COPPE/UFRJ – Laboratoire FAST, Orsay, France, with Prof. Dominique Gobin, 1999-2002.
8. International Cooperation Program, “Mathematica Technical Center – MTC”, COPPE/UFRJ and Wolfram Research Inc., USA, International Agreement, 1999-2003.
9. International Cooperation Program, “Center for Analysis and Simulation in Environmental Engineering - CASEE”, COPPE/UFRJ, EPRI and Tetra Tech Inc., USA, 2001-2004.
10. International Network Project, CNPq/PROSUL - Programa Sul-Americano de Apoio às Atividades de Cooperação em Ciência e Tecnologia, Projeto de Cooperação Sul-Americana em Identificação de Propriedades Físicas em Transferência de Calor e Massa (Coord. Prof. Helcio R.B. Orlande), 2005-2011.
11. International Cooperation Project, Thermal image processing methods for microscale characterization, Projeto CNPq-CNRS (coord. Prof. Helcio Orlande), COPPE/UFRJ – ENSAM/Bordeaux and École des Mines d’Albi, France, with Prof. Jean Christophe Batsale and Prof. Olivier Fudym, 2006-2010.
12. International Mobility Project – CNPq/APV, Integral Transforms and Infrared Camera Thermography in Thermal Micro-systems and Conjugated Problems, with Prof. Mourad Rebay, Université de Reims, France, 2010.
13. International Cooperation Project, CNPq & CAPES/DRI/CGCI, Reactive Mass Transport in Soils and Aquifers: Environmental Impact Evaluation of Mineral Industry Waste and its Reuse, with Prof. Martinus van Genuchten, USDA Salinity Laboratory, CA, USA, 2010-2014.
14. International Cooperation Project, Micro-channel heat sinks for high concentration photovoltaics with reuse of the recovered heat for desalination, FAPERJ (coord. Prof. Renato Cotta), COPPE/UFRJ – ETH Zurich, Switzerland, with Prof. Dimos Poulikakos, 2012-2016.
15. International Mobility Project – CNPq/APV, Heat Flux Estimation in Transient Conjugated Problems, with Prof. Jacques Padet, Université de Reims, France, 2013.
16. International Cooperation Project, RCUK-CONFAP/FAPERJ, UK Newton Fund, Integrating water cooled concentrated photovoltaics with waste heat reuse to address the challenges in energy, environment, food and water nexus, University College London, UK & COPPE/UFRJ, with Prof. Stavroula Balabani, 2015-2017.

https://gtr.ukri.org/projects?ref=EP%2fM029573%2f1&pn=4&fetchSize=10&selectedSortableField=firstAuthorName&selectedSortOrder=ASC#/tabOverview

17. International Cooperation Project, Micro and Nanoengineering in Sustainable Energies, CSF/CNPq (coord. Prof. Renato Cotta), COPPE/UFRJ – ETH Zurich, Switzerland, com Prof. Dimos Poulikakos, 2016-2019.
18. Leverhulme Trust Fund, Visiting Professorship grant, Unified Integral Transforms in Microfluidics and Micro-Scale Heat and Mass Transfer (μUNIT), University College London, UK, with Prof. Stavroula Balabani, 2017-2018.
19. International Cooperation Project, Royal Academy of Engineering, RAEng, UK, Self-cleaning coatings for targeting solar energy and water supply mismatch in India and Brazil, Coordinator: Prof. Ioannis Papakonstantinou and Prof. Manish Tiwari, University College London (UK), 2019-2020.
https://www.raeng.org.uk/test-dnp/frontiers-archive/frontiers-follow-on-grants/awardees-2019-2020/self-cleaning-coatings-for-targeting-solar-energy
20. International Cooperation Project, 3D Printing of Piezoelectric Metamaterials for Ambient Energy Harvesting, CNRS 2020 International Emerging Actions (IEA), Principal Investigators – Dr. Liviu Nicu, LAAS & Prof. Carolina Cotta, COPPE – sponsored by CNRS (2021-2023).
21. International Mobility Project – FAPERJ/French Embassy (France-Brasil), METATERM Project: Modelling, Project, Fabrication and Application of Thermal Metamaterials, with Prof. Mohammed Lachi, Université de Reims, France, 2022-2024.
22. Coordinated Research Project – CRP, International Atomic Energy Agency, IAEA, "Low-Grade Thermal Energy from Micro Nuclear Reactors in Membrane Distillation for Electricity; Distilled Water and Hydrogen Cogeneration", Coord. Prof. Carolina Cotta, COPPE-UFRJ, Vienna, Austria, 2023-2026.

EVENTS ORGANIZATION AND LECTURES

1. Member, Organizing or Scientific Committee for more than 100 symposia and international conferences, including Co-Chairman of the International Symposium on Computational Heat Transfer 1997, in Cesme, Turkey, Chairman of the 2nd International Conference on Computational Heat and Mass Transfer, ICCHMT 2001, in Rio de Janeiro, Brasil, Co-Chairman of ENCIT 2004, Rio de Janeiro, Co-Chairman of the School on Microfluidics (Brasília, UNB, 2006).

2. Co-Founder of Symposia Series such as International Conference on Computational Heat and Mass Transfer, ICCHMT, International Symposium on Computational Heat Transfer, CHT, ICHMT, International Symposium in Convection Heat and Mass Transfer in Sustainable Energy, CONV, ICHMT, National Meeting on Thermal Sciences, ENCIT, ABCM, USA-BRASIL Joint Workshop on Thermal Sciences Research, NSF, Workshop on Aviation Safety, WAS, Workshop on Integral Transforms and Benchmark Problems, WIT, Workshop on Applications and Research with Mathematica, WARM, Workshop and Tutorial on Environmental Engineering Modeling, WorkTEEM, ITA Scientific Initiation Meeting, EICITA.

3. More than 190 invited lectures and short-courses in international and national events and Universities, including the International Heat Transfer Conference,

Brighton, UK, 1994, ICHMT International Symposium on Transient Convection, Cesme, Turkey, 1996, NATO ASI on Microscale Heat Transfer, Turkey, 2004, 4th International Conference on Computational Heat and Mass Transfer, Paris, France, 2005, 4th Workshop on Integral Transforms & Benchmark Problems (Rio de Janeiro, 2005), School on Microfluidics (Brasília, UNB, 2006), 1ª. Escola de Nanociências e Nanotecnologia da UFRJ (Rio de Janeiro, 2006), National Congress of Mechanical Engineering (CONEM 2008, Salvador), ICCHMT International Symposium on Convective Heat and Mass Transfer in Sustainable Energy, CONV-09 (Tunisia, 2009), Brazilian Congress of Thermal Sciences and Engineering (ENCIT 2010, Uberlândia, and ENCIT 2012, Rio de Janeiro), International Congress of Mechanical Engineering, ABCM (COBEM 2013, Ribeirão Preto, SP), 13th UK National Heat Transfer Conference, 2013 - (Imperial College, London), ASME 2013 National Heat Transfer Conference - (HT2013, Minneapolis), 3rd International Conference on Computational Methods for Thermal Problems - (ThermaComp2014, Slovenia), ICCHMT International Symposium on Convective Heat and Mass Transfer in Sustainable Energy - (CONV-14, Turkey), ICHMT Int. Symposium on Computational Heat Transfer (CHT-2015, New Jersey), 9th Minsk International Seminar Heat Pipes, Heat Pumps, Refrigerators, Power Sources (Minsk, 2015, Belarus), 7th European Thermal Sciences Conference, EUROTHERM 2016 (Krakow, Poland, June 2016), ICHMT Int. Symposium on Computational Heat Transfer (CHT-2017, Napoli, Italy), Int. Workshop on Sustainable Energy, Power, and Propulsion (ISEPP 2018, Kurukshetra, India), ICHMT Int. Symposium on Turbulence, Heat and Mass Transfer (THMT-2018, Rio de Janeiro), 10th Minsk International Seminar Heat Pipes, Heat Pumps, Refrigerators, Power Sources (Minsk, 2018, Belarus), TOBB-TUBA Energy 2018 (Ankara, Turkey), Science Diplomacy for Sustainable Development (Cairo, 2019, Egypt), 6th Int. Conf. on Thermophysical and Mechanical Properties of Advanced Materials, THERMAM (Cesme, 2019, Turkey), TOBB University – Lecture in Honor of Prof. Sadik Kakaç (Ankara, 2019, Turkey), 10º Encontro Técnico de Materiais e Química, ETMQ (Rio de Janeiro, 2019), 2021 Inauguration Lecture - Centro Universitário SENAI-CIMATEC (Salvador, 2021), Nuclear Technology Trade & Exchange – NT2E, ABDAN (Rio de Janeiro, 2021), ICHMT International Symposium on Advances in Computational Heat Transfer, CHT-21 (Rio de Janeiro, 2021), Int. Symp. on Convective Heat and Mass Transfer in Sustainable Energy, CONV-22 (Izmir, 2022), Nuclear Technology Trade & Exchange – NT2E, ABDAN (Rio de Janeiro, 2023), 17th International Heat Transfer Conference, IHTC (Cape Town, 2023), ABCM International Congress of Mechanical Engineering (COBEM 2023, Florianópolis), 11th Encontro Técnico de Materiais e Química, ETMQ (Rio de Janeiro, 2023), 9th Thermal & Fluids Engineering Conf., ASTFE (Corvallis, 2024), M. Necati Ozisik Annual Lecture, NCSU (Raleigh, 2024), 18th UK National Heat Transfer Conference, UKNHT (Birmingham, 2024), 6th International Conference on Computational Methods for Thermal and Energy Problems, ThermaEComp (Budva, 2024).