CURRICULUM VITAE

Nezia de Rosso, PhD

Research Center for Rheology and Non-Newtonian Fluids – CERNN
Federal University of Technology Parana – UTFPR
Dep. Heitor Alencar Furtado, 5000 – Campo Comprido, Curitiba – PR, 81280-340
Brazil

Contact:	nezia@funtefpr.org.br
	+55 (41) 98748-2188
ORCID:	0000-0001-7210-9783
LinkedIn:	linkedin.com/in/neziaderosso

Education

2018–2022	**Ph.D. in Mechanical and Materials Engineering**, Federal University of Technology – Paraná (UTFPR), Curitiba, Brazil
2012–2014	**M.A.Sc. in Mechanical and Materials Engineering**, Federal University of Technology – Paraná (UTFPR), Curitiba, Brazil
2005–2008	**B.Sc. in Mechanical Engineering**, University of the West of Santa Catarina (UNOESC), Joaçaba, Brazil
2025	**Additional training:** University Extension Program in Drilling and Completion Fluids Training (304 h), UFRN, Brazil

Research interests are in the general area of complex fluids, with a focus on rheology and petroleum engineering applications. In recent work, I have expanded into interfacial phenomena, especially how interfacial tension and wettability control emulsion stability and influence enhanced oil recovery (EOR). My work integrates numerical and experimental approaches, including Euler–Euler CFD and field-representative test rigs, to address challenges in drilling hydraulics, fluid displacement (cementing hydraulics), and flow assurance, with emphasis on transient pressure transmission and restart of gelled/paraffinic systems.

Methods/Tools: Rheology (non-Newtonian fluids and suspensions); field-representative flow-loop/annular rigs; transient Euler–Euler CFD; LabVIEW for instrumentation/DAQ.

Professional Experience

- **2014–present** **Senior Researcher**, Federal University of Technology - Paraná (UTFPR), Research Center for Rheology and Non-Newtonian Fluids (CERNN), Curitiba, Brazil.
  - *Highlighted Achievements:*
    - Reduced **drilling days** from **96 to 44** (**-52 days, ~54%**) by developing a model that predicts **drillstring movement forces in the presence of cuttings**, enabling faster well-hydraulics planning and mitigation of drag/stuck-pipe risks.

* Quantified the impact of temperature, cooling rate, and flow rate on the **restart-pressure peak** in waxy-crude oil flow by designing and constructing a **50-m flow-loop experiment** under field-representative operating conditions, showing **up to 11.5× variation** in restart pressure (**+1050%**) depending on operating conditions.
* Increased primary cementing displacement efficiency, showing turbulent flow tends to deliver $\alpha_2 \sim 1$ across $Re \approx 3.1 \times 10^2$ to 1.5×10^4, by leading **large-scale annular fluid-displacement experiments** and mapping performance versus density ratio, viscosity ratio, and eccentricity (17% vs 60%), identifying **density ratio as the dominant control parameter**.
* Quantified **apparent/relative viscosity evolution** in Herschel–Bulkley non-colloidal suspensions as a function of **Plastic number** and **Reynolds number**, showing an exponential viscosity increase with Plastic number and a faster time-dependent viscosity decay at higher Reynolds numbers due to accelerated sedimentation, using a validated Euler–Euler CFD model for parallel-plate rheometry.
* Established **safe viscosity-measurement limits** for non-colloidal suspensions by identifying a **critical modified Reynolds number ($Re_{\mathrm{mod}} \sim 10^{-3}$)** where apparent viscosity approaches the homogeneous value, using **transient Euler–Euler CFD** across different geometries (cone-and-plate, parallel-plate, concentric-cylinder; CP/PP/CC) (showing ≤**5%** 1-h deviation in CC vs. up to **60%** in CP).
* Quantified the impact of **NaCl** and **$CaCl_2$** brines on **pressure transmission** and **restart pressures** of paraffin- and olefin-based drilling fluids, showing that **$CaCl_2$-based systems** exhibit **higher restart pressures** and **stronger time dependence**.

– *Ongoing projects:*

* Formulating a **lightweight synthetic oil-based drilling fluid, reducing density from 8.8 to ~6.0 ppg (−2.8 ppg, ~32%)** by incorporating low-density particles (e.g., hollow microspheres) and novel thickening agents to optimize stabilization, while maintaining rheological performance.
* Formulating a **lightweight water-based drilling fluid, reducing density from 9.5 to ~7.3 ppg (−2.2 ppg, ~23%)** by incorporating low-density particles (e.g., hollow microspheres) and sustainable plant-based fibers, and optimizing dispersion/stabilization, while maintaining rheological performance.
* Investigating the effect of **crude-oil shrinkage** on **restart pressures**, benchmarking flow-loop observations against **laboratory rheology** to improve field-to-lab scaling and prediction of restart behavior.
* Studying **paraffin-in-oil emulsion stability** as a function of **interfacial tension**, by varying surfactants and relating interfacial-tension measurements to separation kinetics and droplet coalescence in waxy systems.
* Investigating how **oil phase composition** and **emulsifier (surfactant) chemistry** govern the **stability of essential-oil emulsions**, quantifying changes in rheology and linking them to **droplet-size distribution** and destabilization mechanisms (e.g., coalescence/creaming).

- **2009–2011** **Refinery Manager**, Archer Daniels Midland (ADM), Joaçaba–SC and Uberlândia–MG, Brazil.
  - Increased refined soybean oil throughput from **282 to 313 t/day** (**+31 t/day, ~11%**) by optimizing operating conditions and coordinating shift execution.
  - Achieved **zero accidents** by leading HSE execution across shifts, ensuring safe work planning and conducting incident/near-miss investigations with corrective actions.
  - Ensured continuous monitoring and documentation of soybean oil extraction and soybean meal, refined soybean oil, and utilities throughout the full production cycle by serving as Quality & Environment Production Supervisor.
  - Planned and executed scheduled shutdowns and maintenance, managing contractor interfaces, start-up preparation, and safe commissioning activities, ensuring all shutdowns were completed as planned, and the units were ready to return to production on schedule.
  - Led Management of Change updating Standard Operating Procedures, training teams on changes, and maintaining documentation for compliance and audits. Achieved strong audit results, meeting or exceeding required standards.
- **2008** **Trainee**, Archer Daniels Midland (ADM), Joaçaba (SC), Brazil.
  - Supported commissioning and implementation of the refinery and soybean oil extraction plant, including pre-startup safety reviews, loop/functional checks, trial runs, process parameter stabilization, and handover to operations.

Selected Publications

1. Ma, K., Ma, X., Wang, X., Bu, X., Lin, G., Bennacer, R., Ou, J., Wen, D., de Rosso, N., & Zhang, Z. (2026). Advances in porous icephobic surfaces: Toward next-generation aircraft ice protection strategy. *Advances in Colloid and Interface Science*, 350, 103758. https://doi.org/10.1016/j.cis.2025.103758

2. Oliveira, P. V., Fortes, L., Abdala, J., de Rosso, N., Montoya, M. I. H., Maldonado, F. L. R., & Negrão, C. O. R. (2025). Enhancing xanthan gum dispersion in water with ethanol. *Chemical Engineering Research and Design*, 223, 594–602. https://doi.org/10.1016/j.cherd.2025.10.036

3. de Rosso, N., Andrade, D. E. V., & Negrão, C. O. R. (2025). Experimental analysis of waxy crude oil startup flow in pipelines. *Journal of Pipeline Science and Engineering*, 100251. https://doi.org/10.1016/j.jpse.2024.100251

4. de Rosso, N., & Negrão, C. O. R. (2024). Limits for safe viscosity measurement of non-colloidal suspensions in rotational rheometry—a numerical simulation-based approach. *Rheologica Acta*, 63(7), 513–528. https://doi.org/10.1007/s00397-024-01458-8

5. Miyoshi, M. H., de Rosso, N., & Negrão, C. O. R. (2022). A mathematical model for the pull-out of a drill string immersed in a cuttings bed. *Journal of Petroleum Science and Engineering*, 216, 110706. https://doi.org/10.1016/j.petrol.2022.110706

6. de Rosso, N., & Negrão, C. O. R. (2022). Numerical simulation of non-colloidal suspension flows in a parallel-plate geometry. *Rheologica Acta*, 61(1), 69–86. https://doi.org/10.1007/s00397-021-01314-z

Research Funding

1. Project to develop an interface to integrate a transient drilling simulator (hydraulics, drillstring dynamics, and hole cleaning). Petrobras Conexões para Inovação – Startups Module, 2024, Brazil.

2. Project (Centelha Program – 2020), Brazil – Project to develop dynamic analysis of pressures and temperatures in wells, 2023.

Academic Supervision

- **Current:**
  - Akanksha Gavendra (Ph.D. student, 2025–) *Influence of Surfactants on Waxy Paraffin-in-Oil Emulsion Rheology*.
  - Nahyan Tiego Pagliatto de Liz (Ph.D. student, 2025–) *Droplet-Size–Rheology Links in Essential-Oil Emulsion Destabilization*.
  - Fabian Leonardo Ramos Maldonado (M.Sc. student, 2024–) *Formulation and Characterization of Lightweight Water-Based Drilling Fluids Using Alternative Microparticles*.
  - Maria Isabel Hernández Montoya (B.Sc. student, 2024–) *Formulation and Rheological Characterization of a Low-Density Water-Based Drilling Fluid*.
  - Andrew O. Ogundele (B.Sc. student, 2025–) *Mathematical and Numerical Modelling of the Influence of Hydrogel Rheology on Filament Formation and Printability in Extrusion-Based 3D Printing*.
  - Ana Murta (B.Sc. student, 2025–) *Rheological Characterization of Petroleum Tank-Bottom Sludge*.
  - Abraão Braga da Silva (B.Sc. student, 2025–) *Instrumented Rheometry for Drilling Fluids: Real-Time Local Normal/Shear Stress Mapping*.
  - Maicon José (B.Sc. student, 2025–) *Experimental Evaluation of the Effect of Paraffinic Oil Shrinkage on Flow-Restart Pressure*.
  - Kaio Matheus Barros de Oliveira (B.Sc. student, 2025–) *Influence of Surfactants on the Stability of Paraffinic Emulsions*.
  - Felipe Miranda (B.Sc. student, 2025–) *Design of an Experimental Rig to Evaluate the Effect of Pipe Roughness on the Flow-Restart Pressure of Crude Oil*.
- **Completed:**
  - Patricia Vieira de Oliveira (Postdoctoral Fellow, 2024–2025) *Lightweight Synthetic Oil-Based Drilling Fluid Formulation (8.8 to ~6.0 ppg) Using Low-Density Particles*.

- Giovanni Paolo Montagnoli (M.Sc. student, 2022–2025) *Modeling of Two-Phase Liquid–Gas Flow in a Hydrogen Production Cell*. Currently at Rheology Group (GREO), Brazil.
- Mateus Debiase (M.Sc. student, 2018–2021) *Experimental Evaluation of Cuttings Displacement by the Drill Bit–Drill String Assembly in a Horizontal Well*. Currently at Irani Celulose, Brazil.
- Maryelen Hissae Miyoshi (M.Sc. student, 2017–2020) *Modeling the Displacement of the Drill String Immersed in a Cuttings Bed*. Currently at Prysmian, Italy.
- Denis Barbara Barbosa (B.Sc. student, 2023–2025) *Numerical Investigation of Shrinkage Dynamics During Paraffin-Wax Phase Transition*.
- Renan Seidel (B.Sc. student, 2021–2023) *Development of a Device to Evaluate Drilling-Fluid Compressibility*. Currently at Volvo, Sweden.
- Gabriel Gianesini (B.Sc. student, 2021–2022) *Experimental Evaluation of Pressure Variations During Drill-String Movement*. Currently at Volvo, Brazil.
- Fernando Gbur Mazzuchetti (B.Sc. student, 2020–2022) *Experimental Evaluation of the Effect of Drill-String Rotation on Pressure Transmission*. Currently at Volvo, Brazil.
- Marcio Giacomello (B.Sc. student, 2019–2021) *Experimental Evaluation of Fluid Displacement in Primary Cementing*. Currently at Volvo, Brazil.
- Sophia Roennfeldt (B.Sc. student, 2019–2021) *Experimental Evaluation of Drill-String Displacement in the Presence of Cuttings*. Currently at Volvo, Brazil.
- Otávio Augusto Verhagem (B.Sc. student, 2018–2021) *Numerical Evaluation of Fluid Displacement in Primary Cementing*. Currently at TotalEnergies, France.
- Gabriela Tuca Palma (B.Sc. student, 2021) *Experimental Evaluation of Drill-String Displacement in the Presence of Cuttings*. Currently at Volvo, Brazil.
- Julio Jorge de Almeida Abdala (B.Sc. student, 2017–2022) *Experimental Evaluation of Drilling-Fluid Compressibility*. Currently at FUNTEF/UTFPR, Brazil.
- Isabela Rocha (B.Sc. student, 2018) *Rheological Characterization of Non-Colloidal Suspensions*. Currently at Renault, Brazil.
- Maryelen Hissae Miyoshi (B.Sc. student, 2016–2017) *Modeling the Displacement of a Solid Boundary in a Solid–Liquid Medium*. Currently at Prysmian, Italy.
- Gabriel Tanaka Nunes (B.Sc. student, 2017–2018) *Experimental Study of Flow Restart in Thixotropic Fluids*. Currently at Hexagon Manufacturing Intelligence, Belgium.
- Rodrigo Mitishita (B.Sc. student, 2015–2017) *Experimental Study of Pressure Transmission in Drilling Fluids*. Currently at Coanda Research & Development, Canada.
- Fernando Kroetz (B.Sc. student, 2015–2017) *Experimental Study of Crude-Oil Flow Restart*. Currently at Synospe, Brazil.

Teaching Duties

Below is the list of some of the courses I have co-taught.

- 2020.S[1/2] *(Undergraduate)* | **ME76G – Heat Transfer I** | 18 students.
- 2024.T[1/3] *(Graduate)* | **PDC99 – Rheology and Rheometry** | 23 students.
- 2025.T[1/3] *(Graduate)* | **PDC99 – Rheology and Rheometry** | 21 students.

Sample of Invited Lectures & Workshops

- Invited lecture at UTFPR Curitiba (Industrial Processes 2, B.Sc. Chemistry), "Industrial Soybean Oil Extraction Process", Academic Department of Chemistry and Biology, Federal University of Technology of Paraná, Curitiba, Brazil, Feb. 4, 2025 (3 h).
- Invited Speaker at SPE Brazil Tech Tuesday, "Estimating Fluid Contamination during Well Cementing" (talk delivered in Portuguese: "Estimativa da Contaminação de Fluidos durante a Cimentação de Poços"), May 24, 2022.

Peer-Review Service

Reviewer for peer-reviewed journals, including:

- Geoenergy Science and Engineering
- Journal of the Brazilian Society of Mechanical Sciences and Engineering

Organizing Conferences

- Organizer committee the 20th Brazilian Congress of Thermal Sciences and Engineering (ENCIT), Iguazu Falls, Brazil, 2024.
- Organizer committee the IX National Meeting on Oil & Gas Well Construction (ENAHPE), Matinhos, Brazil, 2023.
- Organizer committee the VII Brazilian Conference on Rheology (BCR), Curitiba, Brazil, 2015.

I have also served as Session Chair for various conferences in recent years, including OTC Brasil, the Brazilian Congress of Thermal Sciences and Engineering (ENCIT), the International Congress of Mechanical Engineering (COBEM), the Brazilian Conference on Rheology (BCR), and Colloids 2025.

Funding Review

Reviewer for entrepreneurship and innovation incubation applications, including SprinT (UTFPR's incubator), supporting the evaluation of technology-based ventures throughout the incubation process (e.g., management, technology, market, capital, and entrepreneurship criteria).

Scientific Consulting

Petrobras: consulting on problems associated with restarting the flow of gelled/paraffinic crude oils, 2022.

Patents & Reports of Invention

Patents

- Lima, G. D. S. V.; Negrão, C. O. R.; de Rosso, N.; Barreira, E. M.; Kroetz, F. M.; Carvalho, P. H. Auxiliary System and Method for Starting or Restarting the Flow of Gelled Fluid. United States. USPTO (Privilégio de Inovação), US2021/0356080, **granted Nov. 10, 2021**.
- Kroetz, F. M.; Negrão, C. O. R.; de Rosso, N.; Carvalho, P. H.; Barreira, E. M. Method for Restarting the Flow of Gelled Fluids. Brazil. INPI (Privilégio de Inovação), BR1020160190290, **filed Aug. 17, 2016**.

Software Registration

- Martins, A. L.; Waldmann, A. T. A.; Sansoni Junior, U.; Filipak, D. J.; Miyoshi, M. H.; de Rosso, N.; Negrão, C. O. R. SAPP – Drag Simulator for Well Drilling (SAPP – Simulador de Arraste na Perfuração de Poços). Brazil. INPI (Software/Computer Program), BR512022001876-4, **registered Sep. 21, 2021**.

Technology Spin-off

Co-founded R2 Simulation, a spin-off from the Federal University of Technology – Paraná (UTFPR), specializing in computational fluid dynamics (CFD) and advanced numerical simulation.

Professional Memberships

- The Society of Rheology (SoR)
- Brazilian Society of Rheology (SBR)
- Brazilian Association of Engineering and Mechanical Sciences – ABCM

Collaborations

My research involves sustained collaborations with UTFPR faculty and external academic and industry partners, including UFRGS (Prof. D. E. V. Andrade), UFRJ (Prof. M. Nele), Petrobras (Dr. A. Leihbson; Eng. A. T. A. Waldmann), and Beihang University (Prof. Z. Zhang).

Committee Service

- Member of the Multi-User Management Committee (LabREO), UTFPR, Brazil, 2016–2023.
- Member of the Communication Committee of the Brazilian Society of Rheology (SBR), since 2023.

Community/Public Service Activities

UTFem Extension Program (UTFPR, Curitiba, Brazil) – Member, 2023–Present.

- I participate in a university extension initiative that strengthens a technology and knowledge-driven ecosystem for women's entrepreneurship in STEM, promoting innovation, knowledge transfer, and increased visibility of women-led research aligned with SDG 5 (Gender Equality).

Special Workshop/Training

I have been an instructor for the **Introduction to Rheology for Industrial Applications** course. This is a 3- to 4-day intensive course/workshop for industry participants. This year (2025), the course was offered at Iconic Lubricants in Duque de Caxias, Rio de Janeiro, Brazil.