Morgane Garreau

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Keywords: Biomechanics, Hemodynamics, Computational Fluid Dynamics (CFD), Phase-Contrast Magnetic Resonance Imaging (PC-MRI)/4D Flow MRI, Numerical Simulations, Flow phantoms

Current position

2024-...: Postdoctoral fellow at INRIA Saclay, *France*
Projects: *Numerical modelling for understanding the risk of stroke in sickle cell disease patients*
Predicting the risk of portal vein thrombosis after an hepatectomy in the context of liver cancer
Hemodynamics impact of the TEVAR procedure through a 4D flow MRI longitudinal study

Education

2020-2023: (CIFRE) Industrial PhD student in Mathematics and Modelisation
at Institut Montpelliérain Alexander Grothendieck (IMAG), Université de Montpellier, *France*
in collaboration with Spin Up, Strasbourg-Entzheim, *France*
Title: *Hemodynamic simulations for MRI: quality control, optimization and integration to the clinical practice*
PhD supervisors: Franck NICOUD, Simon MENDEZ - Industrial supervisor: Ramiro MORENO

2017-2019: Master's degree in Biomedical Engineering, Technical University of Denmark (DTU), *Denmark*

2014-2019: Engineering Student, Ecole Centrale de Marseille (ECM), *France*

Previous Experience

2019: 6-month master thesis at Center for Fast Ultrasound imaging (CFU), DTU, *Denmark*
Title: *Biomechanics of the human heart right ventricle* - Supervisor: Marie Sand TRABERG

2016-2017: 6-month training at Julius Wolff Institut (JWI), La Charité Berlin, *Germany*
Title: *Instrumented implants, Orthoload database* - Supervisor: Philipp DAMM

2016: 4-month training at Institut des Sciences du Mouvement (ISM), Aix-Marseille Université, *France*
Title: *Biomechanics of the acetabular labrum* - Supervisors: Patrick CHABRAND, Jean-Marie ROSSI

Awards and Scholarships

- Société de Biomécanique PhD award 2024, *France*
- Société Française de Résonance Magnétique en Biologie et Médecine (SFRMBM) PhD award 2023, *France*
- SFRMBM/FLI scholarship to participate to the ISMRM-ESMRMB 2022, *France*

Skills

Hard skills: Fortran 90 developer, Python and LaTeX user, Scientific computing

Soft skills: Organized, autonomous, presentation and communication of results (French and English), team work in interdisciplinary environments

List of publications

Journal:

M. Garreau, T. Puiseux, R. Moreno, S. Toupin, D. Giese, F. Nicoud, S. Mendez.
Impact of partial echo on 4D flow MRI: the insight from synthetic MRI
Accepted to Magnetic Resonance in Medicine. In Press. doi: 10.1002/mrm.70260. (SJR Q1)

W. Liu, C. Kassasseya, L. Papamanolis, K.-A. Nguyen-Peyre, M. Garreau, S. Eckert, G. De Luna, T. d'Humières, V. de Pierrefeu, C. Arnaud, N. Belkeziz, M. P. Gobin Metteil, C. Provost, J.-F. Gerbeau, S. Verlhac, P. Bartolucci, I. Vignon-Clementel.
Vascular Geometry Drives Stroke Risk in Sickle Cell Disease
American Journal of Hematology 2026; 101:477–486. doi: 10.1002/ajh.70184. (SJR Q1)

M. Garreau, T. Puiseux, S. Toupin, D. Giese, S. Mendez, F. Nicoud, R. Moreno.
Accelerated sequences of 4D flow MRI using GRAPPA and compressed sensing: A comparison against conventional MRI and computational fluid dynamics
Magnetic Resonance in Medicine 2022; 88: 2432-2446. doi: 10.1002/mrm.29404. (SJR Q1)

Pre-print:

S. Eckert, C. Kassasseya, M. Garreau, C. J. Kakpovi, I. Vignon-Clementel, S. Verlhac, B. Bapst, L. Scarcia, H. Guillet, K. Dremont, S. Kouidri, F. Segonds, K.-A. Nguyen-Peyre, P. Bartolucci.
Additive Manufacturing of real-scale carotid artery models: The content–container interaction in sickle cell disease-related cerebral vasculopathy
Pre-Print on BioRxiv. doi: 10.1101/2025.11.09.687432.

Book chapters:

F. Nicoud, M. Garreau, S. Mendez.
Turbulence modeling of blood flow
In *Biomechanics of the Aorta - Modelling for Patient Care*, 387-414. Academic Press, 2024.
Editors: T.C. Gasser, S. Avril, J.A. Elefteriades. doi: 10.1016/B978-0-323-95484-6.00010-5.

S. Mendez, A. Bérod, C. Chnafa, M. Garreau, E. Gibaud, A. Larroque, S. Lindsey, M. Martins Afonso, P. Mattéoli, R. Mendez Rojano, D. Midou, T. Puiseux, J. Sigüenza, P. Taraconat, V. Zmijanovic, F. Nicoud.
YALES2BIO: A General Purpose Solver Dedicated to Blood Flows
In *Biological Flow in Large Vessels*, 183–206. John Wiley & Sons, Ltd, 2022.
Editors: V. Deplano, J.-M. Fullana, and C. Verdier. doi: 10.1002/9781119986607.ch7.

Conference proceedings:

W. Liu, M. Garreau, L. Papamanolis, C. Kassasseya, K.-A. Nguyen-Peyre, N. Belkeziz, S. Verlhac, P. Bartolucci, I. Vignon-Clementel.
In-silico modelling of cerebral vasculopathy risk for children with sickle cell disease
Multidisciplinary Biomechanics Journal 2024; Vol 1. doi: 10.46298/mbj.14483. 49th Congress of the Society of Biomechanics (SB2024), Compiègne, France, 2024.

M. Garreau, R. Moreno, T. Puiseux, S. Toupin, D. Giese, S. Mendez, F. Nicoud.
Numerical hemodynamics simulation of 4D flow magnetic resonance imaging
Abstracts 48th Congress of the Society of Biomechanics (SB2023)
in *Computer Methods in Biomechanics and Biomedical Engineering (CMBBE)* 2023; 26: S145-S147. doi: 10.1080/10255842.2023.2246304. Grenoble, France, 2023.

M. Garreau, T. Puiseux, R. Moreno, S. Toupin, D. Giese, S. Mendez, F. Nicoud.
Comparison of conventional and accelerated 4D flow MRI on a flow phantom
Joint Annual Meeting ISMRM-ESMRMB & ISMRT 31st Annual Meeting. Abstract 0898. London, England, 2022.

Online:

M. Garreau, T. Puiseux, R. Moreno, S. Mendez, and F. Nicoud.
A pulsatile 3D flow relevant to thoracic hemodynamics: CFD - 4D Flow MRI comparison
ERCOFTAC Knowledge Base Wiki, 2021.

Software:

S. Mendez, F. Nicoud, M. Garreau, T. Puiseux, R. Moreno.
VIRTUAL_MRI
Deposited at Agence pour la protection des programmes (APP), 2025.

Invited talks

M. Garreau.
Numerical blood flow simulations in the service of medicine
Mois des mathématiques appliquées et industrielles, Société de Mathématiques Appliquées et Industrielles, Lycée Hemingway, Nîmes, November 2025.

M. Garreau, R. Moreno, T. Puiseux, S. Mendez, F. Nicoud.
Hemodynamic simulations for MRI: quality control, optimization and integration to the clinical practice
PhD award, 49th Congress of the Society of Biomechanics (SB2024), Compiègne, France, October 2024.

International conferences

M. Garreau, A. Facque, A. Vlasceanu, N. Golse, I. Vignon-Clementel.
Portal thrombosis following liver surgery: a preliminary hemodynamic study on shear
CMBBE2025 – 20th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering, Barcelona, Spain, 2025. *Oral Communication.*

W. Liu, L. Papamanolis, C. Kassasseya, K.-A. Nguyen-Peyre, M. Garreau, N. Belkeziz,C. Provost, J.-F. Gerbeau, S. Verlhac, P. Bartolucci, I. Vignon-Clementel.
In-silico modelling of cerebral vasculopathy among pediatric patients with sickle cell disease
The 19th International Symposium on Biomechanics in Vascular Biology and Cardiovascular Disease. Rotterdam, The Netherlands, 2024. *Poster.*

M. Garreau, T. Puiseux, R. Moreno, S. Toupin, D. Giese, S. Mendez, F. Nicoud.
Comparison of conventional and accelerated 4D flow MRI on a flow phantom
Joint Annual Meeting ISMRM-ESMRMB & ISMRT 31st Annual Meeting. Abstract 0898. London, England, 2022. *Poster.*

National conferences

A. Hauguel, M. Garreau, X. Zhang, G. Cardillo, R. Bessaid, A. Azarine, A. Barakat, I. Vignon-Clementel.
Hemodynamics impact of the TEVAR procedure: a 4D flow MRI study
4èmes Journées annuelles du GDR MECABIO Santé, Duo clinicien-biomécanicien, Avignon, November 2025. *Oral communication.*

M. Garreau, S. Eckert, K.-A. Nguyen-Peyre, W. Liu, L. Papamanolis, C. Kassasseya, P. Bartolucci, I. Vignon-Clementel.
Impact of hemodynamics shear forces on sickle cell disease-related cerebral vasculopathy development
Engineering for Health Annual Forum, Palaiseau, France, November 2025. *Poster.*

A. Vlasceanu, M. Garreau, N. Golse, I. Vignon-Clementel.
A hemodynamic model of the hepatic vasculature: impact of liver surgery and thrombotic risk
HemPhys3: 3rd International School on HemoPhysics, Montpellier, France, 2024. *Poster.*

A. Vlasceanu, M. Garreau, N. Golse, I. Vignon-Clementel.
A geometrical and hemodynamic model of the hepatic vascularization: impact of the hepatic surgery
3èmes Journées annuelles du GDR MECABIO Santé, Duo clinicien-biomécanicien, Metz, December 2024. *Oral communication.*

W. Liu, M. Garreau, L. Papamanolis, C. Kassasseya, K.-A. Nguyen-Peyre, N. Belkeziz, S. Verlhac, P. Bartolucci, I. Vignon-Clementel.
In-silico modelling of cerebral vasculopathy risk for children with sickle cell disease
49th Congress of the Society of Biomechanics (SB2024), Compiègne, France, October 2024. *Oral communication.*

M. Garreau, R. Moreno, T. Puiseux, S. Toupin, D. Giese, S. Mendez, F. Nicoud.
Numerical hemodynamics simulation of 4D flow magnetic resonance imaging (4D flow MRI)
48th Congress of the Society of Biomechanics (SB2023), Grenoble, France, October 2023. *Oral communication.*

M. Garreau, R. Moreno, T. Puiseux, S. Mendez, F. Nicoud.
Hemodynamic simulations for MRI
Club utilisateurs IDEA, Siemens Healthineers, Courbevoie, France, March 2023. *Oral communication.*

M. Garreau, T. Puiseux, S. Toupin, D. Giese, S. Mendez, F. Nicoud, R. Moreno.
Comparisons of accelerated 4D Flow MRI sequences against a conventional sequence and computational fluid mechanics (CFD)
6ème congrès de la Société Francaise de Résonance Magnétique en Biologie et Médecine (SFRMBM). Paris, France, March 2023. *Poster.*

Seminars

- Institut de Recherche sur les Phénomènes Hors Equilibre (IRPHé), Marseille, France, March 2026.
- Biomechanics seminar, Pôle de mécanique, Ecole polytechnique/ENSTA Paris, Palaiseau, France, February 2026.
- Laboratoire de Biomécanique Appliquée (LBA), Marseille, France, January 2026.
- Séminaire BMBI, Laboratoire BMBI - BioMécanique et BioIngénierie (UMR CNRS 7338), Université Technique de Compiègne, France, September 2025.
- Research conference in the context of Continuum mechanics course - 1st year postgraduate students, AgroParisTech, Palaiseau, France, September 2025.
- Séminaire des doctorant.es, IMAG, Université de Montpellier, France, January 2022.

Teaching

Master course (M1) **Continuum mechanics** - 13.5h (14h eq. TD), $\sim$ 24 students
2025/2026 - AgroParisTech, Université de Paris-Saclay
Lecture and practical works in computational fluid dynamics on Comsol.

Master course (M1) **Numerical simulations in fluid mechanics** - 24h (31.5h eq. TD), 24 students
2024/2025 - Université de Versailles Saint-Quentin-en-Yvelines
Conception of a 1st year postgraduate course. Lectures and practical works (Python and Ansys Fluent) in computational fluid dynamics: finite difference and finite volume methods, temporal discretization.

Bachelor course (L3) **Mathematical remedial** - 3×15h, ∼ 15 students
2020/2021, 2021/2022, and 2022/2023 - Polytech Montpellier
Tutorial for 3rd year undergraduate students in materials engineering: Tensors, Differential calculus, Ordinary differential equations and Partial differential equations.

Supervision

Middle school and high school internships - 1/2 day, 2-3 times a year.
Presentation of careers in research and the daily life of a researcher. INRIA Saclay, Palaiseau, France. 2024 & 2025.

Rendez-vous des Jeunes Mathématiciennes et Informaticiennes (RJMI) - 2 days.
Meeting for high school girls interested in mathematics and computer science to discover the field of research. Supervision of a group of 4 students. INRIA Saclay, Palaiseau, France. February 2024.

Scientific mediation

Fête de la science. *Scientific divulgation and workshop facilitation on INRIA Saclay stand.* Ecole Normale Supérieure Paris-Saclay, Palaiseau, France. 2024 & 2025.

Scientific escape game for qBio Master's students. M. Garreau, A. Amalric, J.-C. Perez, M. Kitzmann, M. Péquignot. *Organization with two other PhD students of an escape game for Master's students in Quantitative Biology for their introductory bootcamp.* Génopolis, Montpellier, France. September 2021.

Responsabilities

Delegate of the scientific convention "From the creation of knowledge to its reception by civil society". Fédération des ingénieurs et scientifique de France (IESF). Since October 2025.

Member of the Local Sustainable Development Committee. INRIA Saclay, Palaiseau, France. Since 2024.

Non-permanent researchers (PhD and PostDoc) representative at the lab council. Institut Montpelliérain Alexandre Grothendieck, Montpellier, France. 2021-2023.

Substitute representative for PhD students in Biostatistics & Mathematics and Modelisation. Information, Structures et Systèmes (I2S) doctoral school, Montpellier, France. 2021-2023.

Alumni representative for the students admitted to Ecole Centrale de Marseille in 2014. Since 2017.