

CHRISTINA MAHMOUD

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| Montpellier, France | 07 71 52 42 44

ACADEMIC BACKGROUND AND EXPERIENCE

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|------------------------|--|
| Since 2023 | PhD in Applied Mathematics — CNRS / Institut Montpelliérain Alexander Grothendieck (IMAG), University of Montpellier, France |
| Supervisor : | Hélène Mathis — helene.mathis@umontpellier.fr |
| Thesis topic : | <i>Approximation of hyperbolic systems with relaxation; application to two-phase flows (ongoing PhD thesis)</i> |
| Main research topics : | <ul style="list-style-type: none">• Construction of two <i>unsplit asymptotic-preserving</i> schemes for hyperbolic systems with relaxation.• Relative entropy analysis for asymptotic preserving schemes to the Jin & Xin model• Hierarchy of hyperbolic relaxation models (two-phase flows). |
| 2024-2026 | Additional teaching duties — University of Montpellier, France |
| Teaching load : | 63 h/year (2024-2026); 48 h (2023-2024) |
| Courses taught : | Scientific reasoning (L1-SVSE) HAV220X ; Mathematical tools 3 (L1-PCSI) HAS202X ; Remedial mathematics (L1-SVSE) HAS202X |
| 2022-2023 | Master 2 (MANU) — Modelling and Numerical Analysis — University of Montpellier, France |
| M2 internship : | LAMPS — University of Perpignan, France |
| Supervisor : | Mikaël Barboteu — barboteu@univ-perp.fr |
| Co-supervision : | Francesco Bonaldi — francesco.bonaldi@univ-perp.fr ; Serge Dumont — serge.dumont@univ-perp.fr |
| Title : | A mathematical and numerical formulation of hyperelastic problems for the modelling of soft biological tissues (6 months) |
| Work : | hyper-visco-elasticity; numerical approximation and analysis; solution via <i>Primal–Dual Active Set method</i> ; simulations |
| 2021-2022 | Private mathematics tutor for high-school students. |
| 2019-2021 | Master's degree — Fundamental and Applied Mathematics — Lebanese University, Beirut, Lebanon |
| M2 internship : | Institut P' (PPrime) — University of Poitiers, France (4 months) |
| Work : | high-performance computing; turbulence; natural convection; numerical analysis and simulations |
| 2016-2019 | Bachelor's degree — Mathematics — Lebanese University, Beirut, Lebanon |

PUBLICATIONS

Published articles

1. M. Barboteu, F. Bonaldi, S. Dumont, C. Mahmoud. *An energy-consistent discretization of hyper-viscoelastic contact models for soft tissues*. **Computer Methods in Applied Mechanics and Engineering**, 2024, In press. <https://doi.org/10.1016/j.cma.2024.116785>

Submitted work

1. C. Mahmoud, H. Mathis. *Asymptotic Preserving Schemes for Hyperbolic Systems with Relaxation*. **Preprint (HAL)**, 2025, HAL-05291431 v1. <https://cnrs.hal.science/IMAG-MONTPELLIER/hal-05291431v1>

Work in progress

1. Relative entropy analysis for asymptotic preserving schemes to the Jin & Xin model [In preparation]

CONFERENCES

Talks

- 10/2024 **CJC-MA2024** — Uniformly accurate asymptotic-preserving schemes for hyperbolic systems with relaxation.
Lyon (FR)

Posters

- 06/2025 **Numerical Methods for Hyperbolic Problems** — *Unsplit asymptotic-preserving schemes for hyperbolic systems with relaxation*.
Darmstadt (DE)

05/2025 **Seventh Workshop on Compressible Multiphase Flows** — *Unsplit asymptotic-preserving schemes for hyperbolic systems with relaxation.*
Strasbourg (FR)

06/2024 **New Trends in the Numerical Analysis of PDEs** — *Uniformly accurate schemes for hyperbolic relaxation systems.*
Lille (FR)

06/2024 **Sixth Workshop on Compressible Multiphase Flows** — *Uniformly accurate schemes for hyperbolic relaxation systems.*
Strasbourg (FR)

COMPUTING SKILLS

Python Development of simulation and analysis codes (PhD work).

C++ Scientific programming (M2 MANU practical sessions) — *beginner.*

R Data analysis tools — *beginner.*

MODULEF Finite element code: use and adaptation — *beginner.*

Maple, MATLAB Symbolic and numerical computation (second-year practicals) — *beginner.*

LANGUAGES

Arabic Reading, writing, speaking.

French Reading, writing, speaking.

English Reading, writing, speaking.

ADMINISTRATIVE ACTIVITIES

Since 2025 Member of the ANGUS team (Inria), supervised by Nicolas Seguin.

2022 **Early childhood educator** — Fingerprints, Beirut (Lebanon).

2019 Participation in the organisation of the international conference **LICMA'19** (Mathematics and Applications), Lebanese University — Hadath, Lebanon.