

# Duc Thach Son Vu

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## Postdoctoral Associate

Department of Earth & Planetary Sciences  
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## EXPERIENCE

### Yale University

#### Department of Earth and Planetary Sciences

Postdoctoral Associate, September 2024 - present  
Mentor: Prof. Matthew Eisaman (Yale), Dr. Jacob Jordan (Porecast)

### National University of Singapore (NUS)

#### Department of Mathematics

Postdoctoral Research Fellow, November 2022 - August 2024  
Mentor: Prof. Weiqing Ren (NUS)

### Institut français du pétrole et Énergies nouvelles (IFP Énergies nouvelles), France (*French Institute of Petroleum and New Energy*)

#### Department of Applied Mathematics

Ph.D. candidate in Mathematics and Computer Science, November 2017 - October 2020

### École Polytechnique, France

#### Centre de Mathématiques Appliquées (CMAP)

(*Center for Applied Mathematics*)

Master 2 Internship in Applied Mathematics, April 2017 - July 2017

## EDUCATION

### Université Paris-Saclay, France

#### (*Paris-Saclay University*)

Ph.D. in Mathematics and Computer Science, October 2020

- Title: Numerical resolution of algebraic systems containing complementary equations.  
Application to the thermodynamics of compositional multiphase mixtures.
- Advisors: Dr. Tran Quang Huy (IFPEN, Rueil-Malmaison), Prof. Mounir Haddou (Univ Rennes, INSA, CNRS, IRMAR), Dr. Ibtihel Ben Gharbia (IFPEN, Rueil-Malmaison).
- Jury: Prof. Abdel Lisser (president), Prof. Samir Adly, Prof. Didier Aussel, Prof. Hoai-An Le-Thi, Prof. Jean-Pierre Dussault.
- Day of defense: October 7, 2020.

**Université d'Orléans, France**  
(*University of Orléans*)

Master in Applied Mathematics, July 2017

- Thesis: Transmission condition in irregularly shaped thin layers applied to diffusion MRI
- Advisor: Dr. Jing-Rebecca Li (INRIA Saclay-Equipe DEFI; CMAP, École Polytechnique)
- GPA: 17.8/20 (mention très bien) – Rank: 2<sup>nd</sup> (out of 17)

**Vietnam National University, Ho Chi Minh City - University of Science, Vietnam**

Bachelor of Science in Mathematics, Honors Program, October 2016

- Thesis: Superlinear p-Laplace equation without Ambrosetti and Rabinowitz condition
- Advisor: Prof. Duong Minh Duc (VNUHCM-US)
- GPA: 9.45/10 (High Distinction) – Rank: 1<sup>st</sup> of VNUHCM-US (out of over 1500)

## HONORS & AWARDS

- Ph.D. fellowship, funded by IFP Energies Nouvelles, France, 11/2017 - 10/2020.
- Master 2 Internship at CMAP, Ecole Polytechnique, awarded by INRIA Saclay, 04-07/2017.
- Honor certificate of Vietnam National University, Ho Chi Minh City for the valedictorian of University of Science, 2016.
- Scholarship of Vietnam Institute for Advanced Study in Mathematics (VIASM) for top students in National Program for the Development of Mathematics from 2010 to 2020 (NPDM), Vietnam, 2013, 2014, 2015 and 2016.
- Odon Vallet Award for top high school students, Vietnam, 2011 and 2012.
- Third prize, Vietnam Mathematical Olympiad (for high school students), 2012.
- Consolation prize, Vietnam Mathematical Olympiad (for high school students), 2011.

## PUBLICATIONS

- Dissertation

Numerical resolution of algebraic systems containing complementary equations. Application to the thermodynamics of compositional multiphase mixtures, 2020. [HAL Id: tel-02987892](#)

- Published papers

1. **Duc Thach Son Vu**, Tan M. Nguyen, Weiqing Ren, *Learning and predicting dynamics of compositional multiphase mixtures using Graph Neural Networks*, under review, Journal of Computational Physics. [Article](#).
2. **Duc Thach Son Vu**, Weiqing Ren, *A deep learning approach for solving the stationary compositional two-phase equilibrium problems*, Communications in Nonlinear Science and Numerical Simulation, Volume 138, November 2024, 107883. [Article](#).  
[doi:10.1016/j.cnsns.2024.107883](https://doi.org/10.1016/j.cnsns.2024.107883).
3. **Duc Thach Son Vu**, Ibtihel Ben Gharbia, Mounir Haddou, Quang Huy Tran, *A new approach for solving nonlinear algebraic systems with complementarity conditions. Application*

*to compositional multiphase equilibrium problems*, Mathematics and Computers in Simulation, Volume 190, December 2021, Pages 1243-1274. [Article](#).

[doi:10.1016/j.matcom.2021.07.015](https://doi.org/10.1016/j.matcom.2021.07.015).

4. Ibtihel Ben Gharbia, Mounir Haddou, Quang Huy Tran, **Duc Thach Son Vu**, *An analysis of the unified formulation for the equilibrium problem of compositional multiphase mixtures*, ESAIM: Mathematical Modelling and Numerical Analysis (ESAIM: M2AN), Volume 55, Number 6, November-December 2021, Pages 2981 - 3016. [Article](#).

[doi:10.1051/m2an/2021075](https://doi.org/10.1051/m2an/2021075).

5. Jing-Rebecca Li, Van-Dang Nguyen, Try Nguyen Tran, Jan Valdman, Cong-Bang Trang, Khieu Van Nguyen, **Duc Thach Son Vu**, Hoang An Tran, Hoang Trong An Tran, Thi Minh Phuong Nguyen, *SpinDoctor: a Matlab toolbox for diffusion MRI simulation*, NeuroImage, Volume 202, 15 November 2019, 116120. [Article](#).

[doi:10.1016/j.neuroimage.2019.116120](https://doi.org/10.1016/j.neuroimage.2019.116120).

## TEACHING EXPERIENCE

- Preparation course for French-Vietnam Master 2 in Applied Mathematics, Vietnam, September 2017.

## TALKS & ORAL PRESENTATIONS

- PGMO Days 2019 (Gaspard Monge Program for optimization, operations research and their interactions with data sciences), EDF Lab Paris-Saclay, Palaiseau, France, December 2019.
- Journées annuelles 2019 du GdR MOA, Rennes, France, October 2019.
- WCGO 2019 Congress (6th World Congress on Global Optimization), Metz, France, July 2019.
- SMAI 2019 Congress (9ème Biennale Française des Mathématiques Appliquées et Industrielles), Guidel Plages (Morbihan), France, May 2019.

## PROFESSIONAL SERVICES

- Organization committee of Journées annuelles 2019 du GdR MOA, Rennes, France, October 2019.

## COMPUTER SKILLS

- Programming: Matlab, Fortran, Python, C/C++, Tensorflow, Pytorch
- Visualization: Paraview
- Other: Latex, Microsoft Office, Linux

## REFERENCES

- Matthew Eisaman  
[matthew.eisaman@yale.edu](mailto:matthew.eisaman@yale.edu)

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- Weiqing Ren

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- Mounir Haddou

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