Jakub Woźnicki

Born on July 12th, 1998
Białystok – Poland
Currently living in Warsaw

jw.woznicki@student.uw.edu.pl

Scientific Interests

Calculus of variations, Non-linear partial differential equations, Relative entropy methods, Fluid mechanics, Kinetic equations.

Education

University of Warsaw/ PhD candidate
OCTOBER 2022 – NOW

"Approximation techniques in partial differential equations and calculus of variations". Under completion.

University of Warsaw / Masters in Mathematics
OCTOBER 2020 – JULY 2022

"On some problems in fluid mechanics". Under the supervision of prof. dr hab. Piotr Gwiazda and prof. dr hab. Agnieszka Świerczewska-Gwiazda.

Graduated with honors. I spent one semester at the University of Bonn thanks to the Erasmus+ program.

University of Warsaw / Bachelor of Science
OCTOBER 2017 – AUGUST 2020

"The theory of Young measures and its application in partial differential equations". Under the supervision of prof. dr hab. Piotr Gwiazda

Graduated with honors.

Research projects

"Various notions of convergence in partial differential equations"
JULY 2024 – NOW

Principal investigator of the project nr: 2023/49/N/ST1/02737, National Science Center, Poland. Preludium grant.

"Approximation techniques in partial differential equations and calculus of variations"
OCTOBER 2022 – NOW

Scholarship as a PhD student under the project nr: 2021/43/O/ST1/03031, National Science Center, Poland. Preludium BIS

grant.

"Foreign doctoral internship"
JANUARY 2025 – APRIL 2025

Foreign internship under the project nr: BPN/PRE/2023/1/00025, Polish National Agency for Academic Exchange via Preludium BIS NAWA.

"Relative entropy methods for non-linear systems"
DECEMBER 2020 – MAY 2021

Scholarship as a PhD student under the project nr: 2017/27/B/ST1/01569, National Science Center, Poland. OPUS grant.

Publications

1) **J. Woźnicki.** *Weak-strong uniqueness for a class of generalized dissipative weak solutions for non-homogeneous, non-Newtonian and incompressible fluids.* Nonlinear Anal. Real World Appl., 64:Paper No. 103426, 16, 2022. https://doi.org/10.1016/j.nonrwa.2021.103426

2) M. Bulicek, P. Gwiazda, J. Skrzeczkowski, **J. Woźnicki**. *Non-Newtonian fluids with discontinuous-in-time stress tensor.* Journal of Functional Analysis, 285(2), 109943. https://doi.org/10.1016/j.jfa.2023.109943

3) D. Gallenmuller, P. Gwiazda, A. Swierczewska--Gwiazda, **J. Woźnicki.** *Cahn-Hillard and Keller-Segel systems as high-friction limits of Euler-Korteweg and Euler-Poisson equations.* Calculus of Variations and Partial Differential Equations, 63(2), 1-27. https://doi.org/10.1007/s00526-023-02656-7

4) M. Bulíček, **J. Woźnicki**, *Parabolic equations with non-standard growth and measure or integrable data,* Nonlinear Analysis, Volume 251, 2025, 113676, ISSN 0362-546X, https://doi.org/10.1016/j.na.2024.113676

Preprints

5) C. Seis, E. Wiedemann, **J. Woźnicki.** *Strong Convergence of Vorticities in the 2D Viscosity Limit on a Bounded Domain.* https://arxiv.org/abs/2406.05860

6) M. Bulíček, **J. Woźnicki**. *On various models describing behaviour of thermoviscoelastic rate-type fluids.* https://arxiv.org/abs/2502.03735

7) P. Gwiazda, **J. Woźnicki,** A. Wróblewska-Kamińska, A. Zimmermann*. Stochastic parabolic equations in Musielak-Orlicz spaces with discontinuous in time N-function.* https://arxiv.org/abs/2506.13305

8) **J. Woźnicki,** *Vlasov equation coupled with non-Newtonian fluids with discontinuous-in-time stress tensor.*
https://arxiv.org/abs/2509.04110

9) **J. Woźnicki,** Ewelina Zatorska, *Existence and weak-strong uniqueness of measure solutions to Euler-alignment/Aw--Rascle--Zhang model of collective behaviour.*
https://arxiv.org/abs/2511.05326

Oral communications

"Recent advances in the modeling of electrorheological fluids"
16 SEPTEMBER 2025
Hydrodynamic models and multi-scale analysis in PDEs, Warsaw, Poland.

"Strong convergence of vorticity. From Navier–Stokes to Euler in a bounded domain"
10 JUNE 2025
Hyperbolic limits of interacting agent systems, Venice, Italy.

14 JUNE 2024
Equadiff 2024, Karlstad, Sweden.

"Cahn-Hillard and Keller-Segel systems as high friction limits of Euler-Korteweg and Euler-Poisson equations"
11 JUNE 2024
Equadiff 2024, Karlstad, Sweden.

14 MAY 2024
Mathematical Aspects of Fluid Flows, Kacov, Czech Republic.

25 APRIL 2024
The Cahn-Hillard equation - recent advances and new challenges, Chęciny,
Poland. **(Invited Speaker)**

"Non-Newtonian fluids with discontinuous-in-time stress tensor"
24 AUGUST 2023
10th International Congress on Industrial and Applied Mathematics, Tokyo, Japan.
14 JUNE 2023
Crossing the borderlines in fluids and biology, Chęciny, Poland.

06 DECEMBER 2022
MathFlows, Luminy, France.

01 DECEMBER 2022
Recent trends in mathematical modelling, Kacov, Czech Republic.

"Weak-strong uniqueness for density dependent, incompressible, non-Newtonian fluids"
14 SEPTEMBER 2022

Conference on the Applications of Mathematics, Zakopane, Poland

08 AUGUST 2022
Recent Advances in Kinetic Theory and Fluid Dynamics Models, Warsaw, Poland

"Mv-strong uniqueness for density dependent, incompressible, non-Newtonian fluids"
25 NOVEMBER 2021
Multiscale Models for Complex Fluids: Modeling and Analysis, Banff International Research Station [online].

Other activities

I have spoken at seminars, including the ones at:

University of Oxford,

Polish Academy of Sciences,

University of Warwick,

University of Freiburg,

Charles University.

I have participated in the following summer schools.

Particles in Flow
23 JUNE 2025 – 27 JUNE 2025

University of Bonn

Hyperbolic problems in Nuremberg
24 SEPTEMBER 2025 – 26 SEPTEMBER 2025

University of Erlangen-Nuremberg

Research visits

Charles University, Prague
04 SEPTEMBER 2023 – 20 DECEMBER 2023

Visiting the Professor Miroslav Bulicek. The visit was financed by the Excellence Initiative at the University of Warsaw

01 NOVEMBER 2022 – 15 NOVEMBER 2022

Visiting the Professor Miroslav Bulicek. The visit was financed by the grants of the supervisor and the host institution.

University of Erlangen-Nuremberg, Erlangen
03 APRIL 2023 – 13 APRIL 2023

Visiting the Professor Emil Wiedemann. The visit was financed by the grants of the supervisor and the host institution.

University of Warwick, Coventry

23 SEPTEMBER 2024 – 22 DECEMBER 2024

Visiting the Professor Ewelina Zatorska. The visit was financed by the Excellence Initiative at the University of Warsaw

University of Oxford, Oxford

12 JANUARY 2025 – 12 APRIL 2025

Visiting the Professor Endre Suli. The visit was financed by the Polish National Agency for Academic Exchange.

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Prizes and awards

1) First prize in the contest "Step into the future" (organized by mBank foundation) for the best student's thesis in mathematics,

2) First prize in the contest "LVI contest for the best student's thesis in probability theory and applied mathematics" (organized by the Polish Mathematical Society),

3) First prize in the contest "Marian Rejewski competition for the best master thesis in applied mathematics" (organized by Lodz University of Technology),

4) Laureate of the scholarship "Stypendium na Start" given by the University of Warsaw, for the best first-year PhD students.