Mathias Dus

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Postdoc under the supervision of Pr Virginie Ehrlacher.
Cermics, team Modeling, Analysis and Simulation (MAS).

Education/Experience

Paris, France
École nationale des ponts et chaussées, Postdoc *2022 – now*
Solve the Fokker-Planck equation in high dimension using neural networks

Toulouse, France
Deeplinks, Data scientist *2021 – 2022*
Use of graph databases and type theory to ease knowledge storage and acquisition

Toulouse, France
Institut de mathématiques de Toulouse, Phd thesis in applied mathematics *2018 – 2021*
Under the supervision of Pr Franck Boyer and Pr Francesco Ferrante

Toulouse, France
ISAE-SUPAERO, Master of Engineering SUPAERO (head of promotion 2014/2015) *2014 – 2018*
Fluid dynamics, numerical simulation, distributed computing

London, United Kingdom
Imperial College London,MSc in applied mathematics (head of promotion) *2016 – 2017*
Modules : fluid dynamics, functional analysis, numerical simulations, partial differential equations, stochastic processes, vortex dynamics, dynamical systems, tensorial calculus and general relativity

Research

Journal papers

1. M. Dus et V. Ehrlacher (2023). *Numerical solution of Poisson partial differential equation in high dimension using two-layer neural networks*. arXiv : 2305.09408 [math.NA]
2. M. Dus (2022b). "The discretized backstepping method : An application to a general system of 2x2 linear balance laws". In : *Mathematical Control and Related Fields*
3. M. Mathias, F. Ferrante et C. Prieur (2022). "Spectral stabilization of linear transport equations with boundary and in-domain couplings". en. In : *Comptes Rendus. Mathématique* 360, p. 219-240. DOI : 10.5802/crmath.288
4. M. Dus (2022a). "Exponential stability of a general slope limiter scheme for scalar conservation laws subject to a dissipative boundary condition". In : *Mathematics of Control, Signals, and Systems* 34, p. 37-65. DOI : 10.1007/s00498-021-00301-2
5. Mathias Dus (2021). "BV Exponential Stability for Systems of Scalar Conservation Laws Using Saturated Controls". In : *SIAM Journal on Control and Optimization* 59.2, p. 1656-1679. DOI : 10.1137/20M1323837
6. M. Dus, F. Ferrante et C. Prieur (2020). "On L^∞ stabilization of diagonal semilinear hyperbolic systems by saturated boundary control". In : *ESAIM Control Optim. Calc. Var.* 26, Paper No. 23, 34. ISSN : 1292-8119. DOI : 10.1051/cocv/2019069

Conferences with presentation

1. New Monge Problems and Applications (Université Gustave Eiffel, 2023)
2. CEMRACS (Université Aix-Marseille, 2023)
3. Phd students and postdocs seminar (ENPC, 2023)
4. ENSTA seminar IDEFIX (ENSTA, 2023)

5. SMAI congress (Montpellier, 2021)

Conferences without presentation

1. IPAM, UCLA Los Angeles (March-April 2023) : "New Mathematics for the Exascale : Applications to Materials Science" long program.
2. Webinar "Control in Time of Crisis" (2020-2021)
3. Control and stabilization issues for PDE (Toulouse, 2019)
4. Numerical Methods for the Kinetic Equations of Plasma Physics (Munich, 2018)

Teaching

1. Lectures and tutorials for Licence 3 students in analysis, statistics and optimization. (ENPC)
2. Lectures and tutorials for Licence 1 students in analysis. (Université Paul Sabatier)
3. Numerical analysis tutorials for Licence 2 and 3 students. (Université Paul Sabatier)

IT qualifications

Dev: Python, React, Neo4J, Spacy
Math: Matlab, Freefem++, R, Keras/Tensorflow

Languages

French: Fluent
English: Advanced (C1) : Toefl IBT 107/120 (2015)
Italian: Level (B1-B2)
Spanish: Basic knowledge