

Amir Atoufi

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Education and Research Background

Research Associate , University of Cambridge Department of Earth Sciences	Oct. 2024 - present
Postdoctoral Research Associate , University of Cambridge Department of Applied Mathematics and Theoretical Physics (DAMTP)	Apr. 2021 - Oct. 2024
Postdoctoral Research Fellow , University of Waterloo Department of Applied Mathematics	Jan. 2021 - Apr. 2021
PhD , University of Waterloo Department of Systems Design Engineering	Sep. 2016 - Dec. 2020
MSc , K. N. Toosi University of Technology Department of Aerodynamics	Sep. 2007 - Sep. 2010
BSc , Islamic Azad University Department of Mechanical Engineering	Sep. 2002 - Sep. 2007

Publications and Works in Progress

In preparation (drafts are available upon request):

- **Atoufi, A.**, Mashayek, A., Taylor, J. R., (2024). Mechanistic upwelling in tidally driven benthic boundary layers, *to be submitted to the Journal of Fluid Mechanics*.

Submitted:

- **Atoufi, A.**, Zhu, L., Lefauve A. L, Taylor, J. R, Kerswell, R. R., Dalziel S. B, Lawrence G. A, Linden P. F, (2024). Three-layer hydraulically controlled transition to turbulence in stratified exchange flows, *Journal of Fluid Mechanics*.
- Jiang, X., **Atoufi, A.**[†], Zhu, L. Lefauve A. L, Taylor, J. R, Dalziel S. B, Linden P. F, (2024). Correlation between fluid deformation and density distortions in stably stratified shear layers, *Journal of Fluid Mechanics*. —[†]
Corresponding author.

Published:

- Skevington, E., Lloyd, C., **Atoufi, A.**, Doak, A., (2024). Instabilities in downslope propagating gravity current. *Proceedings of the NFFDy Summer Programme on “Data in Fluids”*. Apollo - University of Cambridge Repository.
- Zhu, L., **Atoufi, A.**, Lefauve A. L, Kerswell, R. R., Linden P. F, (2024). Long-wave instabilities of sloping stratified exchange flows, *Journal of Fluid Mechanics*. 2024;983:A12.
- Jiang, X., **Atoufi, A.**, Zhu, L. Lefauve A. L, Taylor, J. R, Dalziel S. B, Linden P. F, (2023). Geometry of stratified turbulent mixing: local alignment of the density gradient with rotation, shear and viscous dissipation, *Journal of Fluid Mechanics*. 2023;977:R5.
- **Atoufi, A.**, Zhu, L., Lefauve A. L, Taylor, J. R, Kerswell, R. R., Dalziel S. B, Lawrence G. A, Linden P. F, (2023). Stratified inclined duct: two-layers hydraulics and instabilities, *Journal of Fluid Mechanics*. 2023;977:A25.
- Zhu, L., **Atoufi, A.**[†], Lefauve A. L, Taylor, J. R, Kerswell, R. R., Dalziel S. B, Lawrence G. A, Linden P. F, (2023). Stratified inclined duct: direct numerical simulations, *Journal of Fluid Mechanics*. 969, A20. —[†] Corresponding author.
- **Atoufi, A.**, Scott, K. A., & Waite, M. L. (2021), Kinetic energy cascade in stably stratified open-channel flows, *Journal of Fluid Mechanics*, 925, A25.
- **Atoufi, A.**, Scott, K. A., & Waite, M. L. (2020). Characteristics of quasistationary near-wall turbulence subjected to strong stable stratification in open-channel flows. *Physical Review Fluids*, 5, 64603.
- **Atoufi, A.**, Scott, K. A., & Waite, M. L. (2019). Wall turbulence response to surface cooling and formation of strongly stable stratified boundary layers. *Physics of Fluids*, 31(8), 085114.
- **Atoufi, A.**, Fathali, M., & Lessani, B. (2015). Compressibility effects and turbulent kinetic energy exchange in temporal mixing layers. *Journal of Turbulence*, 16(7), 676–703.
- **Atoufi, A.**, Fathali, M., & Lessani, B. (2013). A-priori evaluations of subgrid-scale terms for large-eddy simulation of compressible turbulent flows. *Journal of Turbulence*, 14(7), 1–23.

Talks

G. K. Batchelor Lab Lunch talk, DAMTP (invited) <i>Mechanistic upwelling in stratified tidal benthic boundary layers</i>	Jun 14 th , 2024
Department of Applied Mathematics, University of Waterloo (invited) <i>Topographically driven stratified turbulent mixing</i>	Feb 8 th , 2024
G. K. Batchelor Lab Lunch talk, DAMTP (invited) <i>Butterfly effects due to long waves and non-localness in stratified shear flows</i>	Jun 9 th , 2023
Fluid Mechanics Seminar, Department of Civil and Environmental Engineering, Imperial College London (invited)	

	Nov 23 rd , 2022
<i>The locality of turbulence in stratified shear flows</i>	
14 th European Fluid Mechanics Conference (EFMC), Athens, Greece	Sep 14 th , 2022
<i>Stratified shear flow control by internal hydraulic effects: DNS and link to transition</i>	
9 th International Symposium on Stratified Flows (ISSF), Cambridge, UK	Aug 29 th , 2022
<i>Stratified shear flow control by internal hydraulic effects</i>	
Canadian Meteorological and Oceanographic Society conference, Victoria, BC, Canada	Jun 2 nd , 2022
<i>Turbulence dynamics in a stably stratified wall-bounded flow</i>	
Atmosphere and Ocean Dynamics group, DAMTP (invited)	Feb 16 th , 2022
<i>Stratified Shear flow dynamics with forcing due to internal hydraulic and confinement</i>	
G. K. Batchelor Lab Lunch talk, DAMTP (invited)	Apr 26 th , 2021
<i>Energy cascade in stratified open-channel flows</i>	

Teaching Experiences	
<ul style="list-style-type: none"> • University of Cambridge, Faculty of Mathematics Supervision (small-group teaching) in the following courses: <ul style="list-style-type: none"> - Dynamics and Relativity (first year), Lent 2023 - Fluid Dynamics (third year), Michaelmas 2023 - Waves (third year), Lent 2024 Assessor, Computational projects (second year), Fluid Dynamics and Numerical Analysis module, Faculty of Mathematics, University of Cambridge, Easter term, 2021 	
<ul style="list-style-type: none"> • University of Waterloo, Department of Systems Design Engineering and Department of Applied Mathematics Teaching Assistant in the following courses: <ul style="list-style-type: none"> - Fluid Mechanics (SYDE 383), Spring 2017- 2019 - Thermodynamics (SYDE 381), Spring 2020 - Advanced Engineering Mathematics 1 (SYDE 211), Winter 2018, 2020 - Applied Linear Algebra (SYDE 312), Winter 2019 - Fundamental of Engineering Mathematics 2 (SYDE 112), Winter 2017 - Matrices and Linear Systems (SYDE 113), Fall 2016- 2020 - Calculus I for Engineering (MATH 116), Fall 2019 - Advanced Engineering Mathematics 2 (tutor for SYDE 311), Spring 2017 	
<ul style="list-style-type: none"> • K. N. Toosi University of Technology, Faculty of Aerospace Engineering <ul style="list-style-type: none"> - Teaching Assistant in Differential Equations, Jan. 2009-Jun. 2009 	

Advisory Roles

- Isaac Barden (supervisor), Research Intern (University of Cambridge), Jun. 2024-Jul. 2024
Project: *Boundary-driven wave breaking and mixing in stratified fluids* (Experiment)
- Valentin Samson (supervisor), Visting Research Intern (École Polytechnique), Mar. 2024-Jul. 2024
Project: *Numerical simulation of shear-driven stratified turbulence*

Industrial Work Experiences

- Mechanical Engineer and Engineering Coordinator** Sep. 2014-Sep. 2016
MSG, a subsidiary of the [Iranian Ship Building and Offshore Industries Complex \(ISOICO\)](#), Tehran, Iran.
- Involved in the engineering design, procurement engineering, and construction engineering of offshore topsides and ancillaries for the South Pars gas field development, phase 14 main platforms, and phase 17/18 satellite platforms
- Mechanical Engineer, Projects Coordinator, and Project Manager** Apr. 2012-Sep. 2014
IPS, a subsidiary of [Iranian Offshore Engineering and Construction Company \(IOEC\)](#), Tehran, Iran.
- Involved in the engineering design, procurement, and construction of the equipment (pressure vessels, chemical injection packages, SPM) for the offshore oil and gas industry.
 - Project Manager and Fluid Dynamics Analyst in the project of construction of the first Iranian-made SPM, South Pars gas field development, Phase 12 Project, Offshore Pipelines section, IOEC-IPS Co, 2013-2014.
- Mechanical Engineer** Oct. 2010- Apr. 2012
Rotary Equipment Department, [Industrial Projects Management of Iran \(IPMI\)](#) Tehran, Iran.
Involved in the mechanical engineering documents review for the onshore refinery in the South Pars gas field development, phase 14.

Awards & Honors

- Endorsed as Exceptional Promise by the Royal Society and awarded the UK Global Talent Visa by the Home Office, 2023.
- Award of additional increments based on the recommendation of the head of the department for outstanding performance in research, DAMTP, University of Cambridge, 2022.
- Graduate Scholarship, University of Waterloo, Fall 2020.
- Awarded attendance funding to participate in Summer Research School on Fluid Dynamics: Topics in Turbulence, 2018, University of Maryland, US (unable to attend).
- University of Waterloo Special Graduate Students Entrance Award, May 2017.
- Project Manager and Fluid Dynamics Analyst in constructing the first Iranian-made SPM, South Pars gas field development, Phase 12 Project, Offshore Pipelines section, [IOEC](#)-IPS Co, 2013-2014.

- Excellent Master of Science Research Thesis, Faculty of Aerospace Engineering, Aerodynamics Department, K. N. Toosi University of Technology, Tehran, Iran, 2010.

Skills

- **Programming:** FORTRAN, MATLAB, Python, Julia
- **Code development and debugging tools:** Visual Studio, Eclipse, ARM DDT (for debugging on clusters)
- **Version Control:** GitHub, Bitbucket
- **GFD model:** [Oceananigans](#)
- **CFD models:** ANSYS Fluent, ANSYS CFX
- **Visualization:** Tecplot, ParaView, VisIt
- **Mathematical software tools:** Maple
- **Fluid Experiments**
Techniques: Shadowgraphs, dye release, particle image velocimetry (PIV), laser-induced fluorescence (LIF)
Software: DigiFlow

Certificates and Research Schools

- NFFDy Summer Program on Data in Fluids (AI and ML), Department of Engineering, University of Cambridge, Jul-Aug 2023.
- WHOI GFD summer seminars series (online), 2021.
- Compute Canada summer school in High-Performance Computing (HPC), McMaster University, 2019.
- Winter School in Physics and Mathematics of Turbulent Flows at Different Scales, LSCE, Les Houches, France, 2019.
- Compute Canada summer school in HPC, University of Waterloo, 2017.

Professional Services

- Demonstrator for the laboratory experiments, summer school in Fluid Dynamics of Sustainable Environment (FDSE), Sep 2023, Cambridge
Outreach activities: Designed, performed, and presented combined Art-Science laboratory experiments for non-expert audiences.
- Referee of *Journal of Fluid Mechanics*, *Journal of the Atmospheric Sciences*, *Journal of Turbulence*
- Chairing 1 session and being part of the organising team of the 9th International Symposium for Stratified Flows (ISSF) 2022, Cambridge
- Organizing and chairing Lab Lunch talks, G. K. Batchelor Laboratory, DAMTP, Jan 2022-Jan 2023

References

- **Paul F. Linden**, DAMTP, University of Cambridge, Cambridge, UK, P.F.Linden@damtp.cam.ac.uk, Tel: +441223 337890.
- **John R. Taylor**, DAMTP, University of Cambridge, Cambridge, UK, J.R.Taylor@damtp.cam.ac.uk, Tel: +441223 337030.
- **Stuart B. Dalziel**, DAMTP, University of Cambridge, Cambridge, UK, S.Dalziel@damtp.cam.ac.uk, Tel: +441223 337911.
- **Michael Waite**, Department of Applied Mathematics, University of Waterloo, Waterloo, Ontario, Canada, mwaite@uwaterloo.ca, Tel: +1(519)-888-4567, ext. 35596.
- **Andrea Scott**, Department of Mechanical and Mechatronics Engineering, University of Waterloo, Waterloo, Ontario, Canada, ka3scott@uwaterloo.ca, Tel: +1(519)-888-4567 ext. 32811.
- **James J. Riley**, Department of Mechanical Engineering, Department of Applied Mathematics, University of Washington, Seattle, WA, USA, rileyj@u.washington.edu, Tel: +1 (206)-543-5347.