

Amir Atoufi

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Education and Scholarly Training

Postdoctoral Research Associate , University of Cambridge Department of Applied Mathematics and Theoretical Physics (DAMTP)	Apr. 2021 - Sep. 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

Academic Appointments

Research Associate Department of Earth Sciences, University of Cambridge	Sep. 2024 - present
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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*.
- **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 hydraulics and resonances in stratified turbulent exchange flows, *to be submitted to the Journal of Fluid Mechanics*.

Submitted:

- 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 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 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		
<ul style="list-style-type: none"> Isaac Barden (supervisor), Research Intern (University of Cambridge), 	Jun. 2024-Jul. 2024	
Project: <i>Boundary-driven wave breaking and mixing in stratified fluids</i> (Experiment)		
<ul style="list-style-type: none"> Valentin Samson (supervisor), Visting Research Intern (École Polytechnique), 	Mar. 2024-Jul. 2024	
Project: <i>Numerical simulation of shear-driven stratified turbulence</i>		

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.		
<ul style="list-style-type: none"> 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.		
<ul style="list-style-type: none"> 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		
<ul style="list-style-type: none"> 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 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.