Jeremy Parker

Postdoctoral researcher
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Research interests

Computational methods for studying unstable and chaotic nonlinear dynamical systems, and their application to geophysical fluid dynamics.

Education

University of Cambridge
PhD, Applied Mathematics, 2020
 Thesis: Linear and nonlinear dynamics in stratified shear flows
MA (Cantab), 2019
MMath, with Distinction, 2016
 Project: Transient growth in a stratified Bickley jet
BA, Mathematics, 2015

Employment

EPFL, Lausanne, Switzerland
Scientist (postdoctoral researcher), 2020-

Arm Ltd, Cambridge
Graduate software engineer, 2016-2017

Teaching

Cambridge undergraduate supervising
10-20 students per course, taught in pairs.

 Mathematical Biology 2019
 Differential Equations 2018 & 2019
 Vector Calculus 2018
 Vectors & Matrices 2017

Cambridge undergraduate admissions interviewing
2018, 2019

EPFL exam marking
2021, 2022

Awards and Fellowships

Geophysical Fluid Dynamics Program Fellow
Woods Hole Oceanographic Institution, 2019

Smith-Knight and Rayleigh-Knight prize
University of Cambridge, Grade 2, 2019
 Essay: The nonlinear behaviour of parallel flows

Talks **Invariant tori in turbulence and chaos**
Upcoming
APS Division of Fluid Dynamics conference, November 2022

Variational methods for finding periodic orbits in turbulence
Upcoming
European Fluid Mechanics Conference, September 2022

Invariant tori in dissipative hyperchaos
Invited talk
Georgia Tech Nonlinear Science seminars, August 2022

Invariant tori in turbulence and chaos
Invited talk
WHOI Geophysical Fluid Dynamics lecture series, July 2022

Finding invariant tori in fluid flows
Invited talk
Applied Mathematics seminars, Keele, January 2022

Limitations of the Miles-Howard Criterion
Invited talk
Cambridge Geophysical & Environmental Processes seminars,
November 2020

**The effects of Prandtl number on the nonlinear dynamics of
Kelvin-Helmholtz instability in two dimensions**
APS Division of Fluid Dynamics conference, November 2020

**Can sum-of-squares programming tell us anything useful
about Hamiltonian chaos?**
Invited talk
ITG seminars, Cambridge, November 2019

Kelvin-Helmholtz instability above Richardson number 1/4
European Turbulence Conference, September 2019

The dynamical system of mixing layers
Invited talk
BPI seminars, February 2019

Finite amplitude Kelvin-Helmholtz billows at high Richardson number
APS Division of Fluid Dynamics conference, November 2018

Publications Parker, J P and Schneider, T M
Invariant tori in dissipative hyperchaos
Preprint: arXiv:2207.05163

Parker, J P and Schneider, T M, 2022
Variational methods for finding periodic orbits in the incompressible Navier-Stokes equations
Journal of Fluid Mechanics 941, A17

Parker, J P, Goluskin, D and Vasil, G M, 2021
A sum-of-squares optimisation method for studying the double pendulum
Chaos 31, 103102

Parker, J P, Howland, C J, Caulfield, C P and Kerswell, R R, 2021
Optimal perturbation growth on a breaking internal gravity wave
Journal of Fluid Mechanics 925, A16

Parker, J P, Caulfield, C P and Kerswell, R R, 2021
The effects of Prandtl number on the nonlinear dynamics of Kelvin-Helmholtz instability in two dimensions
Journal of Fluid Mechanics 915, A37

Parker, J P and Page, J, 2020
Koopman analysis of isolated fronts and solitons
SIAM Journal on Applied Dynamical Systems 19 (4), 2803-2828

Parker, J P, Caulfield, C P and Kerswell, R R, 2020
The viscous Holmboe instability for smooth shear and density profiles
Journal of Fluid Mechanics 896, A14

Parker, J P, Caulfield, C P and Kerswell, R R, 2019
Kelvin-Helmholtz billows above Richardson number 1/4
Journal of Fluid Mechanics 879, R1

Referees   Prof C P Caulfield
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            University of Cambridge
            c.p.caulfield@damtp.cam.ac.uk

            Dr J Page
            School of Mathematics
            University of Edinburgh
            jacob.page@ed.ac.uk

            Prof T M Schneider
            Emergent Complexity in Physical Systems Laboratory
            École Polytechnique Fédérale de Lausanne
            tobias.schneider@epfl.ch