BRANDON MONTEMURO

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SUMMARY OF DOCTORAL RESEARCH

I used asymptotic theory to explain the origin and self-sustenance of quasi-coherent flow structures in the inertial region of the turbulent boundary. The theory involves a mixture of matched-asymptotic and WKBJ analysis to systematically simplify the Navier-Stokes equations. I then wrote pseudo-spectral numerical codes to simulate these reduced equations. Additionally, I have collaborated on work using the generalized quasilinear approximation to simulate plane Poiseuille flow utilizing the *Dedalus* computational framework.

EDUCATION

FALL 2013- MAY 2020
PH.D. IN INTEGRATED APPLIED MATHEMATICS, UNIVERSITY OF NEW HAMPSHIRE
GPA 3.87/4.00

FALL 2006-SPRING 2010
B.S. IN AEROSPACE ENGINEERING, PENNSYLVANIA STATE UNIVERSITY
Minors in Mathematics and Engineering Leadership Development
GPA 3.78/4.00

ACADEMIC POSITIONS

FALL 2019 - PRESENT
POSTDOCTORAL SCHOLAR, UNIVERSITY OF WASHINGTON

FALL 2018
LECTURER, UNIVERSITY OF NEW HAMPSHIRE

- ME 503 – Thermodynamics

FALL 2015 – SPRING 2019
RESEARCH ASSISTANT, UNIVERSITY OF NEW HAMPSHIRE

FALL 2014 – SPRING 2015
TEACHING ASSISTANT, UNIVERSITY OF NEW HAMPSHIRE

- ME 696 – Introduction to Engineering Computing
- ME 503 – Thermodynamics

PROFESSIONAL EXPERIENCE

SUMMER 2010 – SUMMER 2013

SYSTEMS ENGINEER, LOCKHEED MARTIN

- Create new and modify existing requirements
- Write Request for Changes (RFCs), System Problem Reports, and Engineering Directives
- Interface Control Document Point of Contact
- Review incoming Customer RFCs

PUBLICATIONS

PUBLISHED:

- Montemuro B., White C, Klewicki J., & Chini, G. A self-sustaining process theory for uniform momentum zones and internal shear layers in high Reynolds number shear flows. *Journal of Fluid Mechanics,* **901**, A28, 2020
- Chini G, Montemuro B, White C, Klewicki J. A self-sustaining process model of inertial layer dynamics in high Reynolds number turbulent wall flows*, Philosophical Transactions of the Royal Society A .,* **375**, 20160090, 2017

IN REVIEW:

- Manucharyan G, Montemuro B. SubZero: A Sea Ice Model with an Explicit Representation of the Floe Life Cycle. *Journal of Advances in Modeling Earth Systems*

IN PREPARATION:

- Montemuro B, Manucharyan G. SubZero: Lifecycle representation of sea ice floes using a new discrete element model. *Journal of Open Source Software*
- Montemuro B, Manucharyan G, SubZero: Sea Ice Discrete Element Model with Bonded Polygon Implementation

DISSERTATION

An Asymptotic Self-Sustaining Process Theory for Uniform Momentum Zones and Internal Interfaces in Unbounded Couette Flow

HONORS

At University of Washington

- Science Teaching Experience Program-Working in Science Education Scholar 2022-2023

At University of New Hampshire

- CEPS Fellowship Recipient 2013
- Honorable Mention for NSF GRFP 2014
- Summer TA Fellowship 2015
- NSF and USNC/TAM Early Career Presenter Fellowships 2021

At Penn State

- Graduated with Distinction from the Pennsylvania State University
- Diefenderfer Scholarship Recipient

At Lockheed Martin

- Team Special Recognition Award

CONFERENCE PRESENTATIONS

- AGU Fall Meeting 2022 (Upcoming)
    - Lifecycle of sea ice floes reproduced using a new discrete element sea ice model
- Ocean Sciences Meeting 2022
    - Subzero: A new Discrete Element Sea Ice Model with an Explicit Representation of Floe Life Cycle
- International Congress of Theoretical and Applied Mechanics 2020+1
    - A Self-Sustaining Process Theory for Uniform Momentum Zones and Internal Interfaces in Turbulent Shear Flows
- Modeling the Granular Nature of Sea Ice Workshop 2021
    - SubZero: Floe-Resolving Sea Ice Model Validation and Test Cases
- American Physical Society Division of Fluid Dynamics 2018
    - A Self-Sustaining Process Theory for Uniform Momentum Zones and Internal Layers in Wall Turbulence
- UNH Graduate Research Conference 2018
    - Viscous Versus Inviscid Exact Coherent States in High Reynolds Number Wall Flows
- American Physical Society Division of Fluid Dynamics 2017
    - Viscous Versus Inviscid Exact Coherent States in High Reynolds Number Wall Flows
- American Physical Society Division of Fluid Dynamics 2016
    - A Theory for Coupled Uniform Momentum Zones and Vortical Fissures in Turbulent Wall Flows
- UNH Graduate Research Conference 2016
    - Asymptoticically-Reduced Modeling of Coexisting Uniform Momentum Zones and Internal Shear Layers in Turbulent Wall Flows

INVITED TALKS

- UNH IAM Seminar 2022
    - SubZero: Explicit Representation of the Floe Life Cycle with a new Discrete Element Sea Ice Model
- 9th Annual ArcTrain Meeting 2022
    - SubZero: A new Floe-Resolving Sea Ice Model with an explicit representation of Floe Life Cycle
- UW Physical Oceanography Seminar 2022
    - SubZero: Sea Ice Model with an Explicit Representation of a Floe Life Cycle

SERVICE

- Co-organizer for Granular Nature of Sea Ice Workshop 2021
- Review Duties: Journal of Fluid Mechanics, Acta Oceanologica Sinica

SOFTWARE

- Montemuro, B., & Manucharyan, G. (2022, October). Seaice-math/subzero: Subzero v1.0.1. Zenodo. Retrieved from https://doi.org/10.5281/zenodo.7222680 doi: 10.5281/zenodo.7222680

ADVISING

- Summer 2022 - Present
    - Currently advising Camille Viviani and Yuna Liu on undergraduate research at the University of Washington

DIVERSITY, EQUITY, AND INCLUSION ACTIVITIES

- Fall 2022, The Inclusive STEM Teaching Project Atendee
    - The Inclusive STEM Teaching project is a 6 week course designed to advance the awareness, self-efficacy, and ability of faculty, postdocs, and doctoral students to cultivate inclusive STEM learning environments for all their students and to develop themselves as reflective, inclusive practitioners.

SKILLS

Programming Languages

- Matlab
- Julia
- Python
- Dedalus computational framework

PROFESSIONAL MEMBERSHIPS

- 2013-Present *American Mathematical Society*
- 2013-Present *Society of Industrial and Applied Mathematics*
- 2016-Present *American Physical Society*
- 2022-Present *American Geophysical Union*