Jason Torchinsky

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EDUCATION

UNIVERSITY OF WISCONSIN - MADISON | Ph.D. in Mathematics
Expected May 2023 | Madison, WI

UNION COLLEGE | B.Sc. in Mathematics and Physics
June 2018 | Schenectady, NY

PUBLICATIONS

IMPROVED VERTICAL REMAPPING ACCURACY , Torchinsky, J. L., and Taylor, M. A., under review.

ELEMENTARY COMPUTATIONAL FLUID DYNAMICS USING FINITE-DIFFERENCE METHODS , Torchinsky, J. L., and LaBrake, S., Union Digital Works Honors Theses, 1581 (2018), pp. 1–27.[1]

INTRODUCTION TO COMPUTATIONAL TOPOLOGY USING SIMPLICIAL PERSISTENT HOMOLOGY , Torchinsky, J. L., Johnson, B., and Gasparovic, E., Union Digital Works Honors Theses, 1660 (2018), pp. 1–129.[1]

RESEARCH PROJECTS

MULTI-MODEL COMMUNICATION USING KALMAN FILTER-BASED STRATEGIES

University of Wisconsin-Madison Department of Mathematics
November 2019 – Present | Madison, WI
Seeks to create and implement a strategy for multiple different types models to communicate with each other throughout a simulation to improve reliability and accuracy. The strategy will be based on data-assimilation methodologies, such as the ensemble Kalman filter, and be applied to climate models. Advised by Professor Samuel Stechmann.

IMPLEMENTATION OF A HEIGHT COORDINATE FOR THE ENERGY EXASCALE EARTH SYSTEM MODEL

Sandia National Labs (Computational Science Org. 01446)
May 2021 – August 2021 | Albuquerque, NM
Derived and implemented a horizontally-explicit, vertically implicit time-stepping method utilizing a height coordinate for the dynamical core of the atmosphere component of the Energy Exascale Earth Systems Model, and compared it to the pressure coordinate in several test cases introduced by the Dynamical Core Model Intercomparison Project. Advised by Mark Taylor.

IMPROVED VERTICAL REMAP ACCURACY FOR THE ENERGY EXASCALE EARTH SYSTEM MODEL

Sandia National Labs (Computational Science Org. 01446)
May 2021 – August 2021 | Albuquerque, NM
Investigated and implemented alternative remapping strategies for the dynamical core of the atmosphere component of the Energy Exascale Earth Systems Model to eliminate unwanted noise present in several test cases introduced by the Dynamical Core Model Intercomparison Project. Advised by Mark Taylor.

EZ PARALLEL: AN MPI FORTRAN LIBRARY FOR EASING FINITE DIFFERENCE / PSUEDO-SPECTRAL CODE PARALLELIZATION

University of Wisconsin-Madison Department of Mathematics
September 2018 – March 2020 | Madison, WI
Developed a library in modern Fortran with the goal of upgrading a serial geophysical fluid dynamics code to a parallel one, with the ability to parallelize several different numerical methods such as finite difference and discrete Fourier transforms. Advised by Professor Samuel Stechmann. Available here.

EZDFFTPACK: A COLLECTION OF WRAPPERS FOR DFFTPACK

University of Wisconsin - Madison Department of Mathematics
August 2019 | Madison, WI

[1] Name changed in late 2020 from "Jason Louis Turner" to "Jason Louis Torchinsky".

Developed a collection of wrappers for the Fortran double-precision fast-Fourier transform library DFFTPACK. Advised by Professor Samuel Stechmann. Available here.

STATISTICAL ANALYSIS OF RICHTMYER-MESHKOV INSTABILITIES

Los Alamos National Labs

June 2018 – August 2018 | Los Alamos, NM

Statistical analyzed the interfacial properties of fluids undergoing Richtmyer-Meshkov instability based on the initial interface perturbation, and created visualizations in Python. Advised by Jesse Canfield and Juan Saenz.

ELEMENTARY COMPUTATIONAL FLUID DYNAMICS USING FINITE-DIFFERENCE METHODS

Union College Department of Physics

January 2018 – June 2018 | Schenectady, NY

Utilized finite difference methods to simulate various elementary two-dimensional fluid flows in Python, including viscous flows with obstructions and small waves. Advised by Professor Scott LaBrake.

INTRODUCTION TO COMPUTATIONAL TOPOLOGY USING SIMPLICIAL PERSISTENT HOMOLOGY

Union College Department of Mathematics

September 2017 – March 2018 | Schenectady, NY

Analyzed arrangements of BuckyBalls® using persistent simplicial homology computed with Javaplex in MATLAB, and related results to the formation of crystalline structures. Advised by Professors Brenda Johnson and Ellen Gasparovic.

ACHIEVEMENTS AND FELLOWSHIPS

FELLOWSHIPS AND GRANTS

NERSC AY 2020 Exploratory Allocation Award 2020
Department of Energy Computational Science Graduate Fellowship 2019, 2020, 2021, 2022

AWARDS

University Housing's Honored Instructor Award 2019
George H. Catlin (1867) Prize 2018
Martin Terry Resch Prize 2018
Professor Frank Titus Memorial Prize in Physics 2018
Union College Dean's List 2015, 2016, 2017, 2018
James Henry Turnbull (1929) Prize 2016

SOCIETIES

Omicron Delta Kappa Honor Society 2017
Phi Beta Kappa Honor Society 2017
Pi Mu Epsilon Honor Society 2017
Sigma Pi Sigma Honor Society 2017

AFFILIATIONS

Department of Energy Computational Science Graduate Fellowship
University of Wisconsin-Madison Department of Mathematics
American Mathematical Society
Society of Physics Students (Former)
American Physical Society (Former)

TALKS, WORKSHOPS, AND POSTER PRESENTATIONS

Treatment of Ghost-Cell Data for Vertical Remapping in the E3SM ... Sandia National Labs Climate Modelling Seminar Series
Improved Vertical Remapping Accuracy for the E3SM ..... CSRI Summer 2021 Poster Blitz
Statistical Analysis of Richtmyer-Meshkov Instabilities ..... Los Alamos 2018 Computational Physics Summer Workshop
Persistent Homology of BuckyBall® Configurations ..... 2018 Union College Steinmetz Day
The Dynamics of Everyday Fluid Flows ..... 2018 Union College Steinmetz Day
Integrating Fluid Dynamics into the Undergraduate Curriculum ..... 2018 APS March Meeting
Generalizations of Collatz Functions ..... Union College Undergraduate Math Seminar Series

TEACHING

TEACHING ASSISTANT

University of Wisconsin - Madison Department of Mathematics

MATH 221 - Calculus and Analytic Geometry 1 . . . . . Autumn 2018, Spring 2019

COURSE ASSISTANT
Union College Department of Mathematics
MTH 102 - Calculus 2: Integral Calculus . . . . . Winter 2018
MTH 101 - Calculus 1: Differential Calculus . . . . . Autumn 2017

COMMUNITY OUTREACH

ORGANIZER
University of Wisconsin-Madison QGrads
June 2020 - Present | Schenectady, NY

STUDENT REPRESENTATIVE
Union College Committee on LGBTQ+ Affairs
April 2016 - June 2018 | Schenectady, NY

CHAPTER PRESIDENT
Union College Society of Physics Students
January 2015 - June 2018 | Schenectady, NY

TREASURER & PUBLIC EDUCATOR
Union College - Union Pride
October 2014 - June 2018 | Schenectady, NY

COMPUTER SOFTWARE AND PROGRAMMING

Fortran, Python, Matlab, Wolfram Mathematica, and C++.
MPI, FFTW3, netCDF, and LAPACK.