Brandon Gusto

blg13@my.fsu.edu
941-780-3782

EDUCATION

FLORIDA STATE UNIVERSITY

B.S. Mechanical Engineering & Applied Mathematics
Expected May 2017 | Tallahassee, FL
FSU GPA: 3.35 | FSU Math GPA: 3.67

CORE COURSEWORK

Ordinary Differential Equations (A)
Partial Differential Equations I (A)
Partial Differential Equations II (A-)
Applied Linear Algebra I (A-)
Mathematical Modeling (S/U)
Mechatronics I (A)
Numerical Analysis I (A)
Numerical Methods for Engineers (A)
Dynamic Systems II (A)
Thermal-Fluids I (A)
Thermal-Fluids II (A)

COMPUTER SKILLS

Programming Languages & API's:
Fortran • OpenMP • Matlab • C++
C • Mathematica • MPI
Data Visualization:
gnuplot • Tecplot 360 • EnSight
CAD Packages:
PTC Creo
General
LaTeX • Git
Unix/Linux environment

ACTIVITIES & PROJECTS

- Participated in weekly meetings in the computational fluid dynamics research group at FSU
- Audited research advisor's graduate level engineering course, 'Computational Fluid Dynamics for Incompressible Flows'
- External Relations officer for the FSU-FAMU AIAA student chapter
- Intern with the STEM Outreach for At-Risk Youth (SOAR) program

SOCIETIES

- Pi Mu Epsilon National Mathematics Honor Society
- American Institute for Aeronautics and Astronautics

RESEARCH PROJECTS

LOS ALAMOS NATIONAL LABORATORY

2016 Computational Physics Student Summer Workshop
June 2016 - August 2016 | Tallahassee, FL
Project Description: A task-parallel programming model utilizing nested OpenMP multithreading was applied to an unsplit Arbitrary Lagrangian-Eulerian hydrodynamics solver to achieve maximum parallel performance. The model exploits concurrency at a high level in the algorithm which is partially due to the unsplit advection approach. The co-moving mesh velocity may be calculated simultaneously with the gradients and then reconstruction of the fluid variables before the final advection calculations. The simulations were run on HPC's. The task-parallel approach achieved a noteworthy speedup over the unmodified code. In addition to this project, the LANL workshop included over two dozen lectures on a broad range of computational physics sub-disciplines.
Advisor: Dr. Jacob Waltz

NATIONAL HIGH MAGNETIC FIELD LABORATORY

Undergraduate Research Assistant
Jan 2016 - May 2016 | Tallahassee, FL
Project Description: A robust computer program was written for the post-processing of experimental data obtained from cryogenic liquid helium experiments. Below the lambda point (about 2.17 K), helium undergoes a phase transformation and a portion of it is transformed into quantum fluid He-II. The goal of the experiment is to compare the effects of quantum and classical turbulence at a fundamental level using statistical analysis. The computer program was designed to analyze tracer-particle coordinate data from multiple experiments conducted at a range of heat fluxes, then construct probability density functions for both velocity and acceleration components.
Advisor: Dr. Wei Guo

AERO-PROPULSION, MECHATRONICS & ENERGY CENTER

Undergraduate Researcher
May 2015 - July 2015 | Tallahassee, FL
Project Description: CharLES compressible flow solver was used to validate a structured computational grid setup. The test case involved simulating the flow over a circular cylinder at a low reynolds number of two hundred, and low mach number of around 0.1. Post-processing of the data was done using MATLAB. An algorithm was developed to process the force data, which manifested itself as an oscillatory wave due to the shedding of vortical structures at the rear of the cylinder. The algorithm analyzed the properties of the wave to extract information useful for determining quantities such as the Strouhal number, coefficient of drag, and coefficient of lift. In addition,Tecplot was used for data visualization, including instantaneous and time-averaged snapshots of velocity, vorticity, and pressure.
Advisor: Dr. Kunihiko Taira

AERO-PROPULSION, MECHATRONICS & ENERGY CENTER

Undergraduate Researcher
June 2014 - May 2015 | Tallahassee, FL
Project Description: A second look was given to the solutions proposed by M. Bar-Lev and H.T. Yang (1975) to the classical fluid dynamics problem of the initial flow-field of an impulsively started cylinder. The method of matched asymptotic expansions was employed, assuming the presence of a boundary layer at the cylinder surface and a small perturbation parameter. A new boundary layer coordinate system was introduced, and the solution to the governing equation (in this case the two-dimensional vorticity transport equation) was approximated with respect to two different length scales, one representing the large scale motion in the far-field, and the other being valid at the cylinder surface. A composite solution was formed representing the overlap domain where both solutions have validity. Solutions to the partial differential diffusion equations at lower orders were obtained using a similarity variable, and those at higher orders were simply left in terms of non-integrable Green's functions.
Advisor: Dr. Kunihiko Taira