AEROS Summary Presentation

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Outline

- Project Motivation
- Summer Objectives
  - Gain Familiarity with CFD Codebase
  - Onera Retro Propulsion Nozzle Test Case
  - Code Environment Documentation
- Summer Outcomes
- References

Project Motivation

- Pitch for ENAE Honors Thesis: Generalized Modeling of Ionized Flow in Magnetic Nozzles
- Dr. Brehm and I are coordinating on this project
- Will be utilizing the CHAMPS CFD framework

Summer Objectives

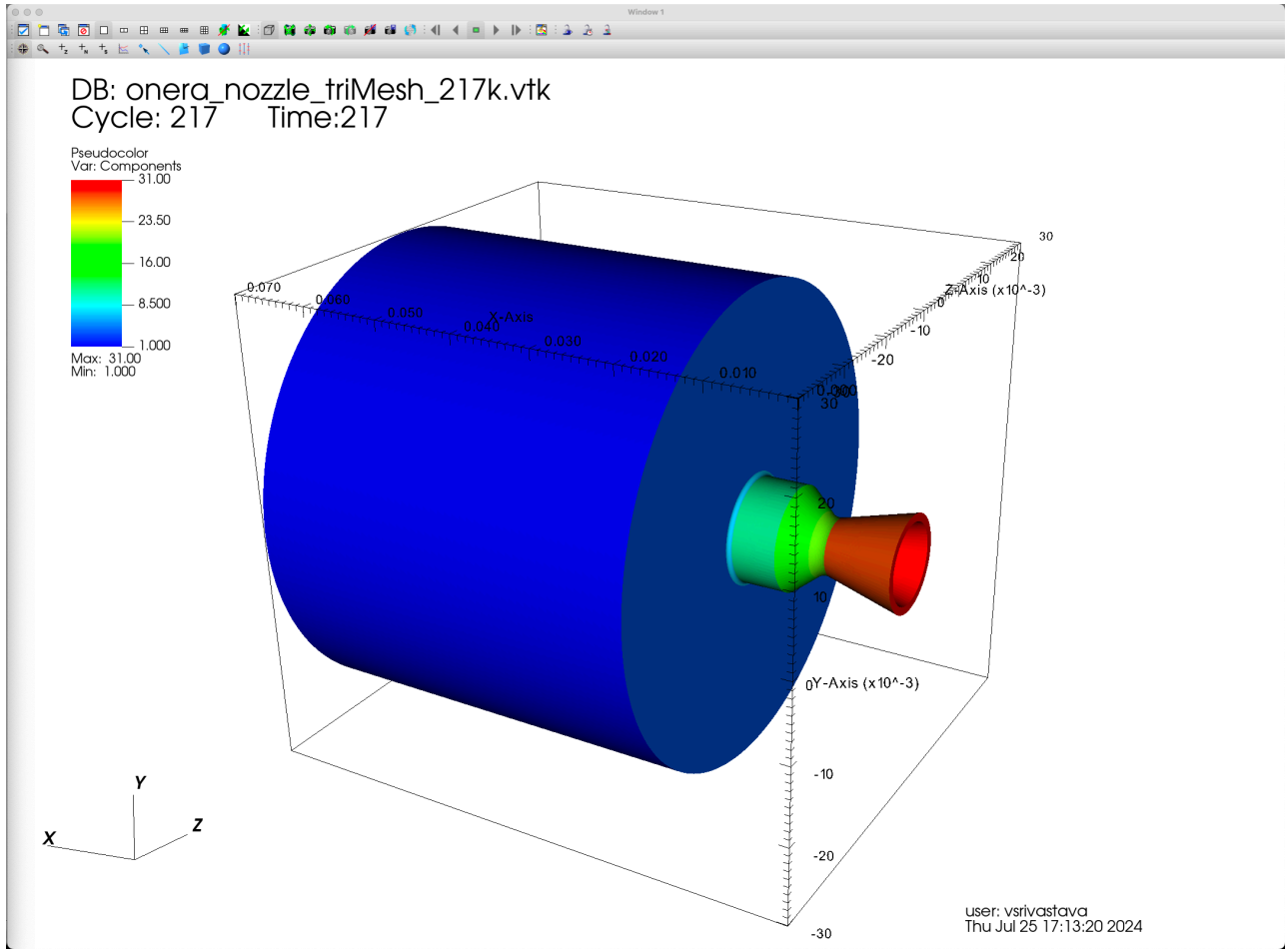
- Gain Familiarity with CFD Codebase
- Onera Retro Propulsion Nozzle Case
- Code Environment Documentation

Gain Familiarity with CFD Codebase

- Reading research papers
- Studying Anderson's Compressible Flow Textbook
- Discussions with Dr. Brehm

ONERA Retro Propulsion Nozzle Case

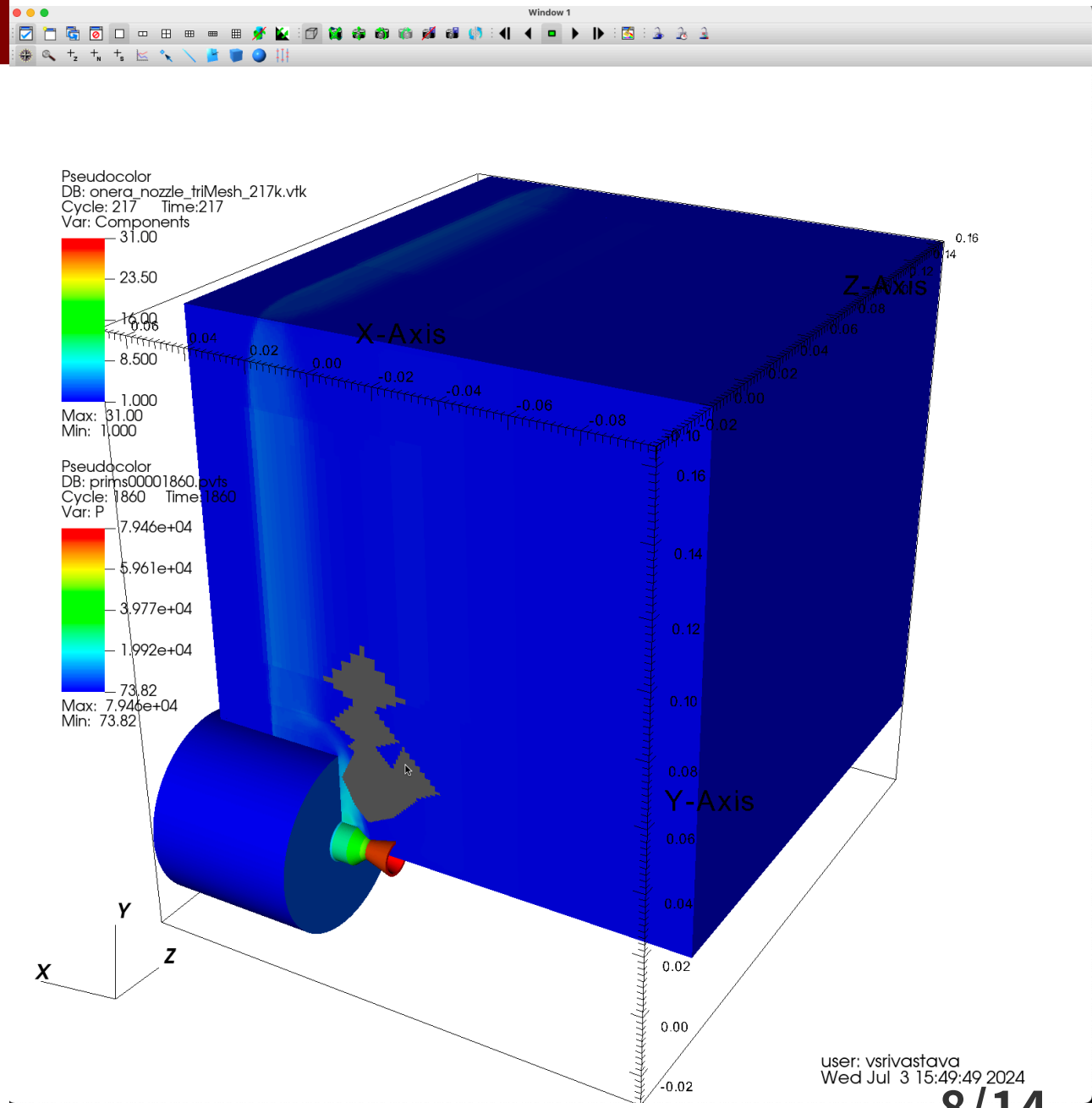
- Retro Propulsion nozzle
- Fairly simple geometry
- ONERA was encountering odd shock formations when running experiments on the nozzle



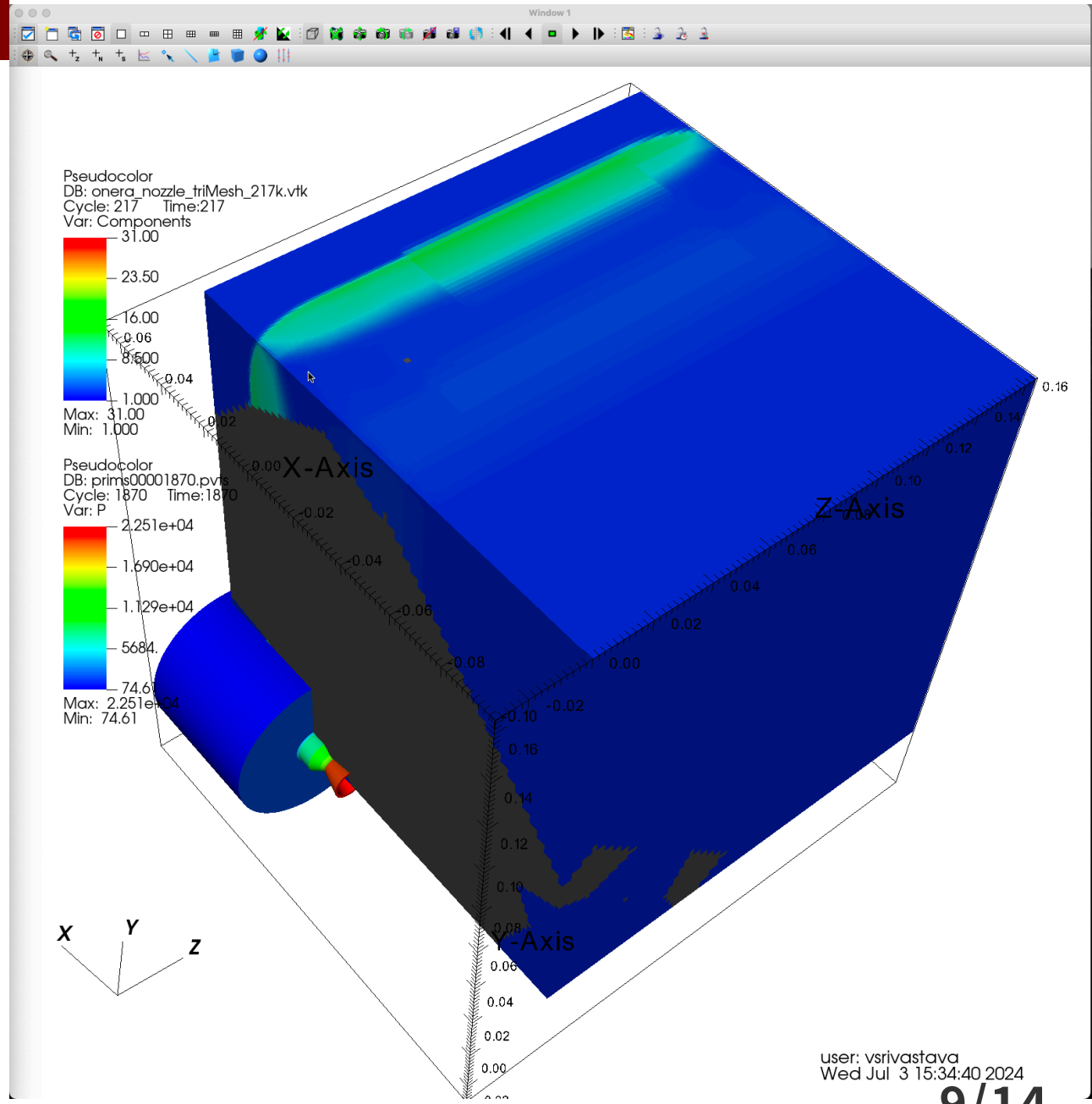
Test Case - GPU Efforts

- Took a short time to get GPU code set up
- Iterated on GPU code and simulation conditions many times, as encountered odd issues
- Joel McQuaid and I worked together on trying to fix this, but could not find a solution

Test Case - GPU Efforts



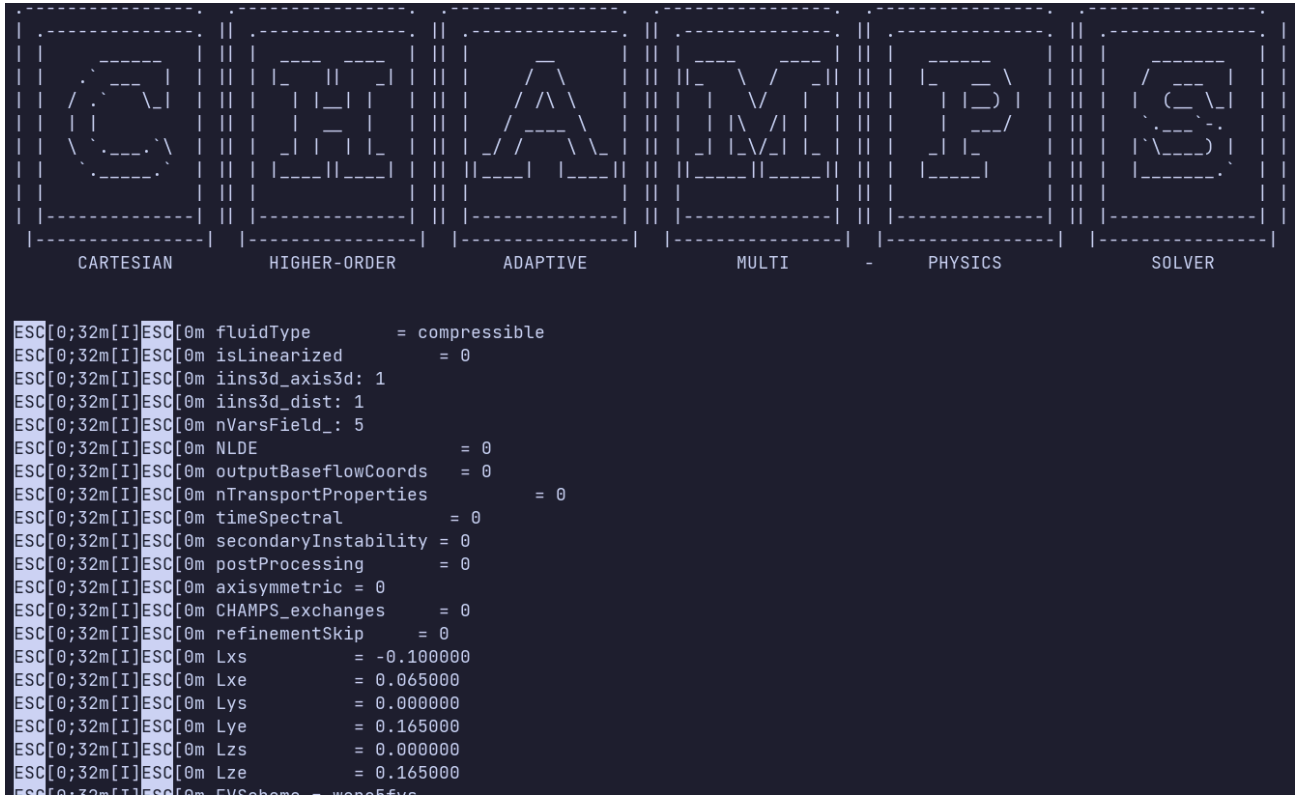
Test Case - GPU Efforts



Test Case - CPU Efforts

- Decided to move test case to CPU
- Took much longer to get set up
- Was only able to get the simulation to run once before program end
- Will continue working in coming weeks to render results (and iterate on cpu code if necessary)

Test Case - CPU Efforts



Code Environment Documentation

- Unfortunately not much to display here, my notes are all in physical notebooks
- I was preoccupied with the ONERA Test Case, and did not have time to digitize my notes
- I plan on digitizing and making them available before the semester starts, in order to aid anyone else who struggles like I did with getting CHAMPS set up.

Summer Outcomes

- ✅ Gain Familiarity with CFD Codebase
- ❌ Onera Retro Propulsion Nozzle Case
- ❌ Code Environment Documentation

Any Questions?