

Zachary Maches

University of California – Santa Barbara

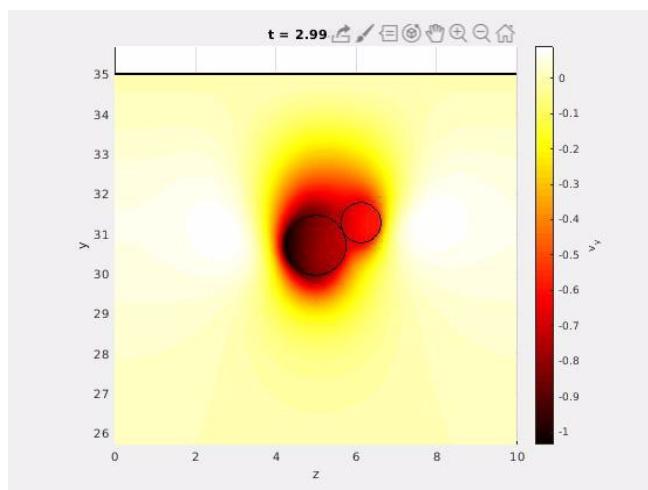
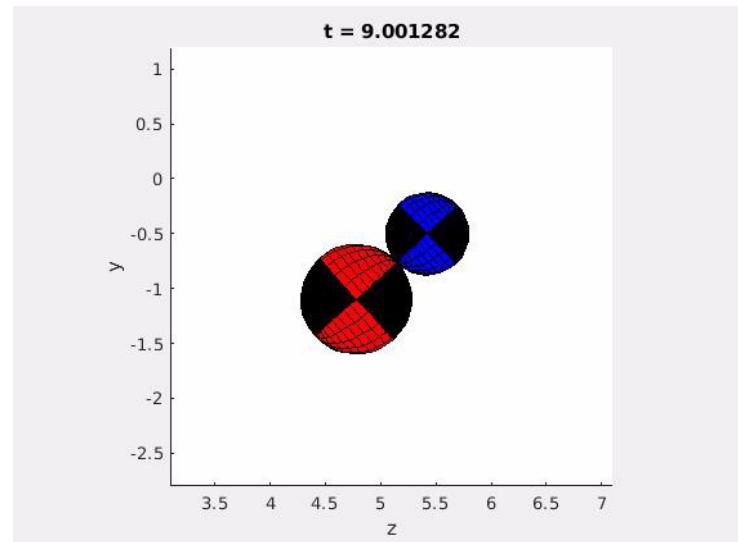
Topic: **Settling Dynamics of Particle Aggregates**

- Open question; highly applicable (eg. carbon dispersion in ocean water)

My Role: Running direct numerical simulations of settling particle pairs in a viscous fluid.

The Model: In-house code (PARTIES), fully resolves both fluid and particle phases

- Generic code; handles wide variety of fluid-particle set-ups
- Generates fluid state (large: velocity, pressure, viscosity, etc. for all grid points) and particle information (small: velocity, position, forces acting on individual particles)
- Parallelized via MPI; requires supercomputing resources depending on case parameters



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Challenges:

- DNS on a large PDE domain: subdivision and communication between processors
- Particle interaction between processors: need to make sure particles are communicated to neighboring processors to handle collisions, rigid bonds
- Editing MPI implementation of existing code

Goals: Knowledge of how to...

- Make parallel code more efficient
- Add to and expand on code without losing MPI/supercomputing functionality
- Improve my existing MPI skills

