

# FLUD

Fluid Dynamics @ USyd

2016 Seminar Series

## Presentation 1 –

Introducing Dedalus: A new, efficient, accurate, and flexible toolkit for geophysical & astrophysical fluid dynamics

By Dr Geoffrey Vasil

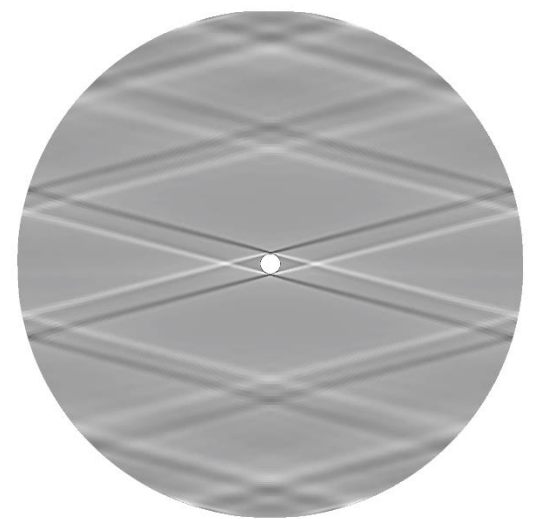
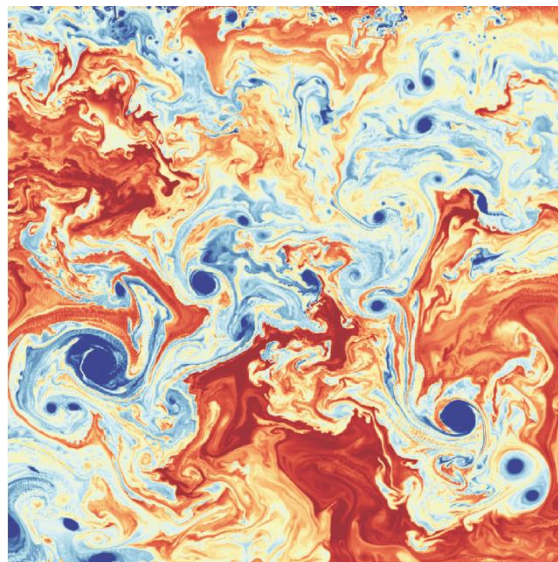
School of AMME,  
University of Sydney

Tuesday 14<sup>th</sup> June

1200-1300 hrs

Mech. Engg Conference Room S316,

All Welcome



**Abstract** – In spite of outward appearances, many of the partial differential equations used in contemporary fluid dynamics, and the methods used to solve them, contain enough similarities that one may consider their implementation under a very general framework. Flexibility is a requirement, not an afterthought. From a user perspective, setting up a new science problem entails (i) choosing a spectral basis for the domain; (ii) defining variables and parameters; (iii) symbolically entering equations; (iv) making a choice of solver; (v) defining on-the-fly analysis tasks; (vi) running the code. Dedalus runs efficiently on computing platforms ranging from laptops to large-scale supercomputers. This talk will focus on describing an equation-agnostic apparatus that incorporates a wide range of possible solving schemes, accurate pseudo-spectral spatial representations, the expressive python language and the basic architecture and algorithms. Thus far, Dedalus has primarily been used to study problems arising in astrophysical and geophysical fluid dynamics, but there exist many more potential novel scientific and engineering applications.

**Further information** – Dr Ben Thornber  
Jack Geoghegan

[ben.thornber@sydney.edu.au](mailto:ben.thornber@sydney.edu.au)

[jack.geoghegan@sydney.edu.au](mailto:jack.geoghegan@sydney.edu.au)