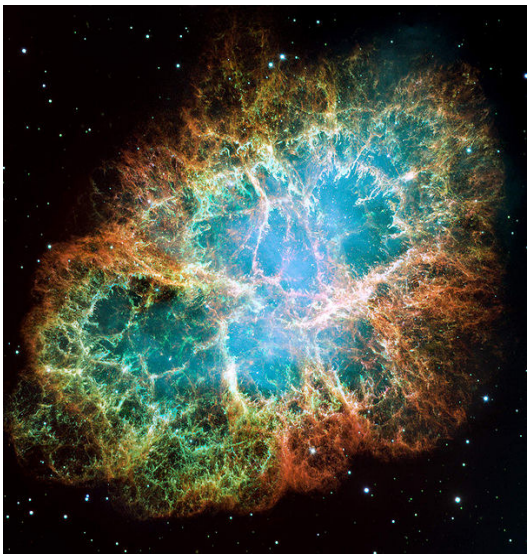
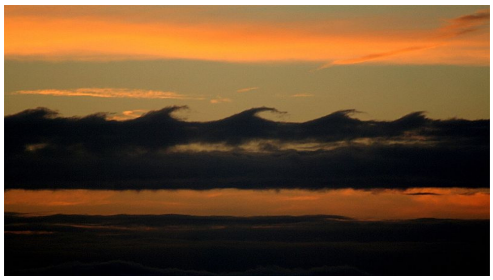
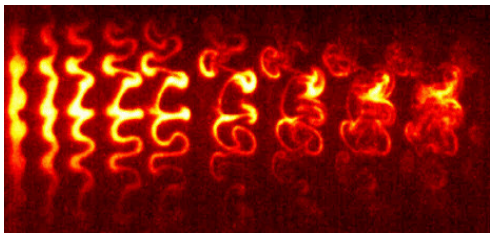
ME225HS: **Hydrodynamic Stability Theory**
Spring 2009







Course goals:

to develop a coherent picture of the hydrodynamic stability theory and to introduce students to both the classical as well as modern ideas/methods

The topics to be covered:

- Basic concepts of stability theory; connection to mechanics
- Classical case study: Rayleigh-Benard convection
- Classical case study: Taylor-Couette instability
- Classical case study: Boundary layer instability
- Instabilities of fluid interfaces (Kelvin-Helmholtz, Rayleigh-Taylor, Richtmyer-Meshkov, Rayleigh-Plateau, Saffman-Taylor, etc.)
- Instabilities of complex interfaces: 2D turbulence
- Some instabilities from geo- and astrophysics
- Nonlinear stability theory (local bifurcation theory, weakly nonlinear analysis and Ginzburg-Landau theory, energy methods)
- Stability of time-dependent flows; elements of a rigorous theory

Suggested textbooks:

- P.G. Drazin and W. Reid, *Hydrodynamic Stability*, Cambridge Univ. Press 1982
- S. Chandrasekhar, *Hydrodynamic and Hydromagnetic Stability*, Dover 1981

Instructor: Prof. Rouslan Krechetnikov
Lectures: MW 2:00-3:15 at Girv 1108