MAE 210C – FLUID MECHANICS III
SPRING 2018

Instructor: Prof. Antonio L. Sánchez
Email: als@ucsd.edu
Office: EBUII 554
Ph: (858) 822 3790

Lectures: Monday 5:00-7:50pm, SOLIS 110
Office Hours: Monday 4:00pm-4:50pm, EBUII 554

Web Page: http://asanchez.ucsd.edu/teaching/mae-210c/

Text Book: Introduction to Hydrodynamic Stability

Grading: homework (20 %)
two 24h take-home exams (40 % + 40 %) handed on 5/7 and 6/4

Motivation:

• “Yet not every solution of the equations of motion, even if it is exact, can actually occur in Nature. The flows that occur in Nature must not only obey the equations of fluid dynamics, but also be stable” (Landau & Lifshitz, 1959)
Lectures (with reference to relevant sections in Drazin):

1. April 2: Introduction to hydrodynamic stability (§1 & §2)
2. April 9: Kelvin-Helmholtz and Rayleigh-Taylor instabilities (§3)
3. April 16: Capillary instability of a jet (§4)
4. April 23: Rayleigh-Bénard convection (§6)
5. April 30: Centrifugal instabilities (§7)
6. May 7: Inviscid instability of parallel flows (§8.1–8.4)
7. May 14: Viscous instability of parallel flows (§8.5–8.10)
8. May 21: Growth of disturbances in space and time (§5.1)
9. May 28: Memorial Day
10. June 4: Transient growth and optimal perturbations. Weakly nonlinear theory (§5.2). The energy method (§5.3)

ADDITIONAL BIBLIOGRAPHY: