

**CHAPTER 14: TURBULENCE****Reading:**

Chapter 14 of Blandford and Thorne.

**Movie To Be Downloaded and Viewed:**

*Turbulence* by R.W. Stewart; available at  
<http://web.mit.edu/fluids/www/Shapiro/ncfmf.html>

Note: the film clips that I showed in class on Monday were from this movie.

**Problems**

## A. Do:

1. Exercise 14.1 part (b): Spreading of a Laminar Wake Behind a Sphere, AND Exercise 14.4 part (b): Turbulent Wake Behind a Sphere [Note: I did parts (a), the wakes behind a cylinder, in class on Wednesday]; OR
2. Exercises 14.2: Spreading of a 2-Dimensional Laminar Jet, AND Exercise 14.5 part (a): Spreading of a 2-Dimensional Turbulent jet. [Note: This is more interesting and challenging than option 1, but will require more work.]

## B. Do: Exercise 14.3 Reynolds Stress and Weak Turbulence Theory

## C. Do:

1. Exercise 14.7 Excitation of Earth's Normal Modes by Atmospheric Turbulence, OR
2. Exercise 14.8 Effect of Drag

## D. Do:

1. Exercise 14.10 Feigenbaum Sequence, OR
2. Exercise 14.12 Strange Attractors