

12.005: Problem Set 5
Due 4/12/06

1) (50%) Just NE of Los Angeles, the San Andreas fault trends approximately N65°W - S65°E. To within observational error, the displacement gradient there is observed to be (each year):

$$\begin{bmatrix} 0.15 & 0.24 \\ 0.00 & -0.15 \end{bmatrix}$$

where x_1 is East, x_2 is North, and the units are 10^{-6} strain.

Write the (two dimensional), strain tensor, the rotation tensor, and the areal dilatation.

What are the directions of maximum principal compression and extension?

Is this what you expect, if the San Andreas is a strike-slip fault?

2) (50%) Turcotte & Schubert, problem [2-27, 1982 edition; 2-29, new edition]. (Don't work too hard getting a formal estimate of the slopes of the lines through the data - an eyeball fit is OK. But do consider what a reasonable estimate of uncertainty might be.)