

CE597M/EAS591 – Geologic and Engineering Seismology

HW#3:

- A. Derive the exact solution for the stress and displacement fields due to either a Mode 1 or Mode 2 or Mode 3 dislocation in a ring. You might be wise to follow the derivation in Timoshenko & Goodier and fill in details.
- B. Suppose that the outer radius goes to infinity. How does the solution change?
- C. Thus far, the radius of the hole is finite. Express the solution in terms of the radial distance, r , divided by the inner radius.
- D. Now, consider what happens to the solution as the ratio approaches 1 and the inner radius approaches the scale of holes in a material or some other very small length scale. What happens to the solution? Do all the terms in the expressions for stresses and displacements remain significant? If not, which ones can be dropped?
- E. Compare your solution to the traditional solutions for a semi-infinite dislocation. You might look at the notes I put on the website.

HW#4:

- A. Program the solution for the displacement field of inclined faults so that you can calculate displacements anywhere in a half-space. (See the paper by Mansinha and Smylie).
[Note that we have corrected the error, which was published in: Okada, Yoshimitsu, 1985. Surface deformation due to shear and tensile faults in a half-space. Bulletin Seismological Society of America, 75:1135-1154. Also, you might be interested (someday) in the paper, Okada, Yoshimitsu, 1992. Internal deformation due to shear and tensile faults in a half-space. Bulletin Seismological Society of America, 82:1018-1040.]
- B. Anyway, in some way automate the plotting of horizontal displacement components. Plot contour maps of vertical displacements.
- C. Add to your program so that you can calculate strains anywhere in the half space.
- D. Add to your program so that you can calculate and plot strains at the ground surface.
- E. After you have your programs running, I will suggest a couple of problems for you to solve for the homework exercise. However, the main purpose of this exercise is for you to develop your own program to use during the course, and later if you wish.

It might help you to download and install a program from my Fauxpli website: SeGaLiFaRF. You will see how we plot various things, particularly maps of surface strains. Use your imagination, though, about how you do these things. I am just trying to tickle your imagination a little!

PS See the course website for links mentioned above.