6.730 PHYSICS FOR SOLID STATE APPLICATIONS

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PROBLEM SET 3

Issued: 2-21-01 Due: 2-28-01, at the beginning of class.

Readings:
PSSA Chapter 4
PSSA Chapter 5

Problem 3.1 *Two-dimensional elastic continuum* **PSSA Problem 4.5**

This problem helps you review the arguments that were done in class and extend them to a different dimension.

Hint: $\mathbf{T} = \lambda e\mathbf{I} + 2\mu\mathbf{E}$.

Problem 3.2 *Lattice Mismatched Epitaxy* **PSSA Problem 4.8**

Problem 3.3 *2D Crystal Structure*

The folowing problem provide excercies in two dimensions to prepare you for Part 1 of the project which is three dimensional. This also introduces you to programs in *Simulations for Solid State Physics* (**SSS**). To access these program on *athena*, type `add 6.730`, then the command `sommer`. Once the screen comes up, click onto *presets* and choose *sommer01*. One way to get a copy of the figures is to do a screen dump with `xdpr` or use `xv`. Go to `http://web.mit.edu/6.730/www/ST00/simulations.html for directions`. (Note that the book is out of print, see attached pages.)

(a) **SSS Exercises: 2.1, 2.3, and 2.4.**

Please answer these questions with figures from the programs or make a simple hand sketches.

To access these program on *athena*, type `add 6.730`, then the command `bravais`. Once the screen comes up, click onto *presets* and choose *brav01*.

(b) **SSS Exercises: 2.6, 2.7, and 2.8.**. Answer the questions and submit a simple sketch.

(c) *Reciprocal Lattice* **SSS Exercises: 2.10, and 2.13.** Answer the questions and submit a simple sketch.

For 2.10 also observe the diffraction patterns with atom B turned off and on. We will explain this difference later.