

Exercise 5.1-3

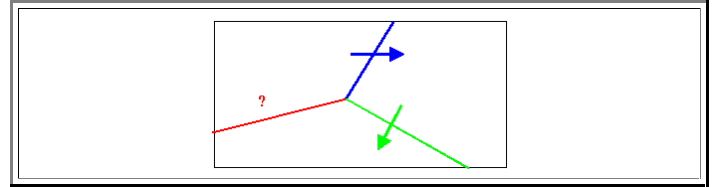
Quick Questions to 5.1: Dislocations - Basics

Here are some quick questions:

- The *answers* are sometimes (and possibly only indirectly) contained in the links.

Draw a schematic lattice fringe picture of a screw dislocation by sketching the planes above and below the dislocation line

Produce the dislocation arrangement shown in the picture by Volterra cuts and determine the Burgers vector of the third dislocation.



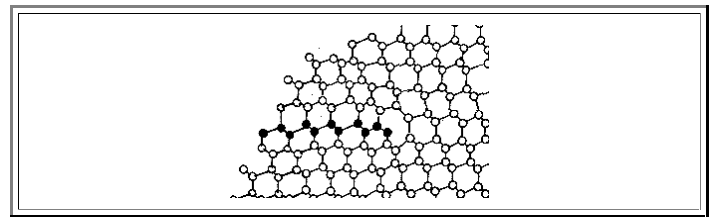
Enumerate at least 5 basic properties of dislocations.

What do you know about the free enthalpy and so on of a dislocation? What is the source of the enthalpy (or energy) of a dislocation? Give a number and discuss consequences for (global and local) equilibrium.

What is the difference between an edge and a screw dislocation?

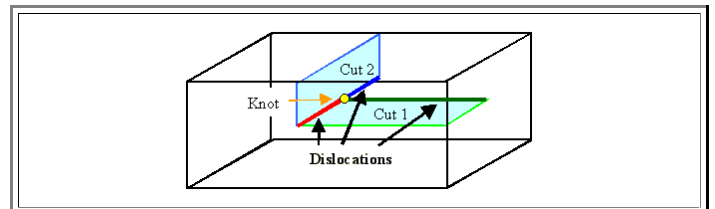
Determine the Burgers vector of the dislocation shown. Here are some hints.

- Try to identify the unit cell first.
- The picture shows a projection of a **fcc** lattice along a $\langle 110 \rangle$ direction
- The crystal is of the diamond type
- If all else fails - use [this link](#)



The three dislocations shown (in black, red and blue) were made by two successive Volterra cuts.

- Three dislocations = three Burgers vectors. How can you determine the three Burgers vectors by the properties of the two cuts?
- Can you obtain this basic geometry by just *one* cut?
- If yes, what kind of Burgers vector would you find in this case for the red line?



Dislocation loops

- Draw a schematic cross-section and a top view of an edge type dislocation loop. Draw in the Burgers vector. Discuss apparent inconsistencies
- What is the glide plane of a dislocation loop with edge type character (make a drawing)
- Can you draw a screw-type dislocation loop?
- Produce an interstitial type and a vacancy type the dislocation loop with the Volterra construction
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