Take Home Exam02D1: Dislocation Movements and Strain

Assigned: Sunday 02/23/2022 (morning)

Due (as pdf by email) 02/25/2022 (within three working days)

You may submit your answers in one of two ways:

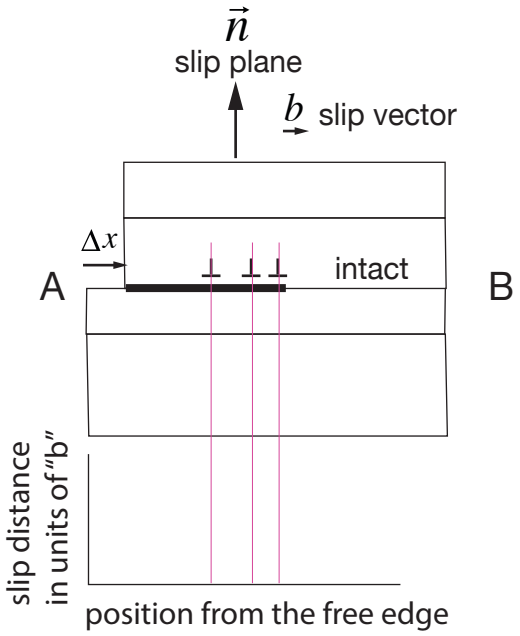
(i) •For typed answers: as a .docx file (as is) or converted into a pdf file. (DO NOT SEND GOOGLE DOC)

•For handwritten answers: Please scan as images, and group together into one pdf file. Or you may hand them manually to my office (ECME-212)

(ii) Please send your submission via email starting with HWExam02D1 in the subject line.

HW 02D1.1

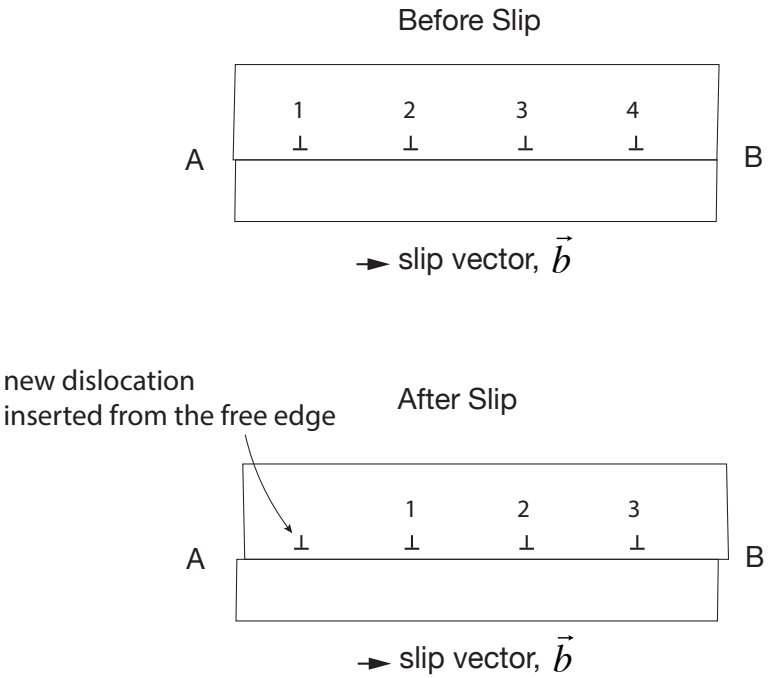
Consider a pile of three "edge" dislocations in a slip plane as shown below

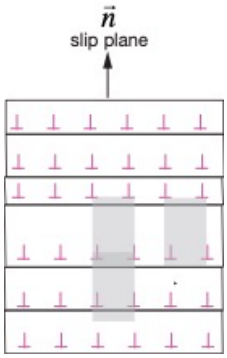


(i) What will be the magnitude of Δx ?

(ii) Draw a graph showing the stepwise distribution of the slip distance along the partial slip plane.

HW 02D1.2



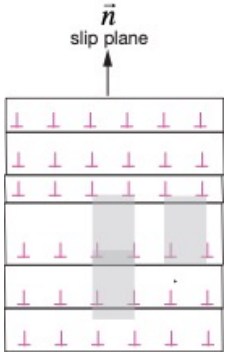


The figure above shows just one slip plane from the figure on the right that we have discussed in class.

Now, suppose that each dislocation moves to the location of the next dislocation as shown in the lower figure.

What will be the magnitude of the slip step that would appear at the left edge?

HW 02D1.3



Assume that all dislocations in the above schematic move to the right to occupy the position of the next adjacent dislocation.

Draw a schematic of the slipped edges that will appear on the side of the crystal. Give the magnitude of these edge lengths in units of $\vec{b}$.