Imperfections in the Atomic Arrangement.

Line Defects or Dislocations

These are line imperfections in a perfect lattice

There are two types of Line Defects

1. Screw Dislocation
2. Edge Dislocation.

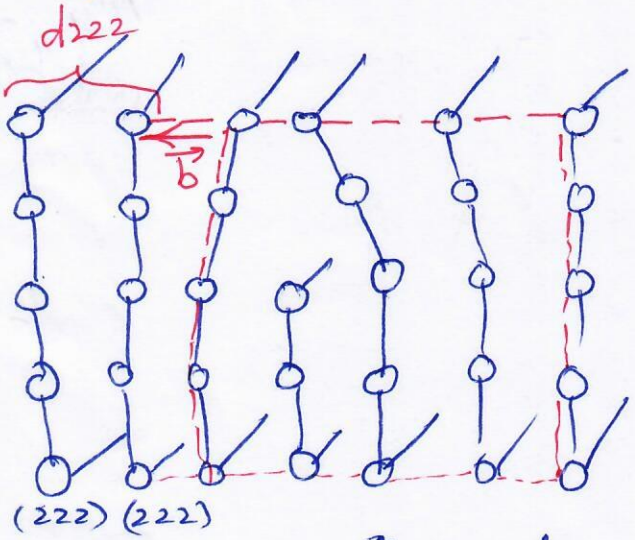


Fig — The Burgers vector is ⊥ to (222) planes and has a length equal to the inter planar spacing between (222) planes

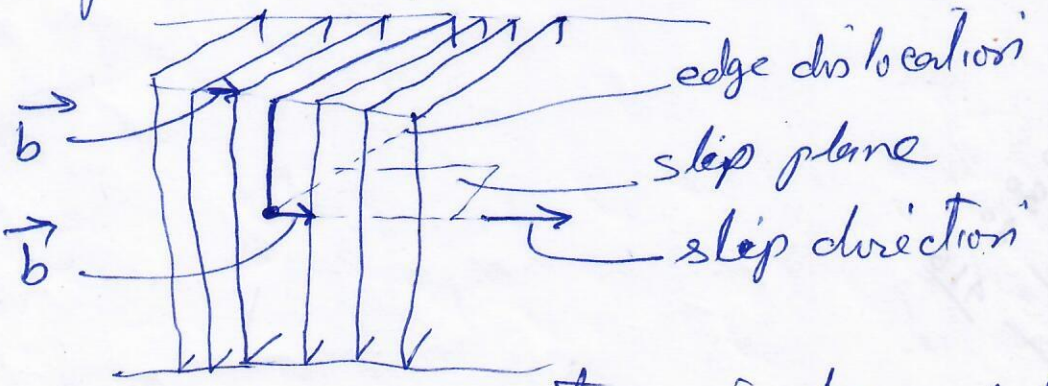


Fig — Also Burgers vector in transolated

EXAMPLE

A BCC structure is with a lattice parameter of $4.0A^0$ that contains the Dislocation shown. Determine the direction and length of Burgers vectors.

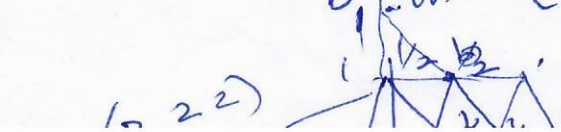
Solution

The clockwise loop around the dislocation is closed by the vector $\vec{b}$. Because $\vec{b}$ is $\perp$ to (222) planes. The miller indices of direction $\vec{b}$ must be [222] or in lowest integers [111]. The magnitude of $\vec{b}$ is the distance between two adjacent (222) planes

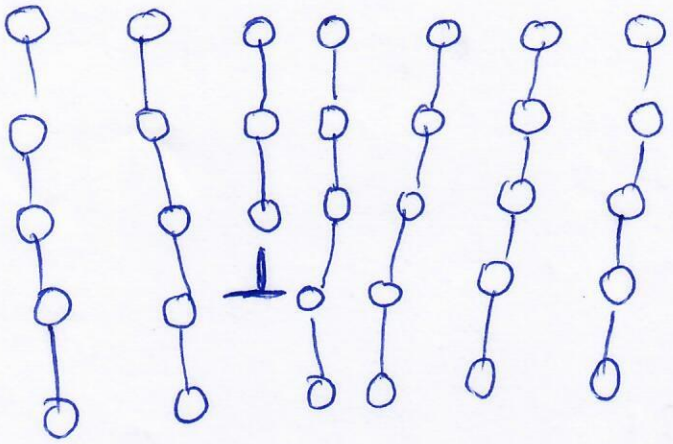
$$d_{222} = \frac{a_0}{\sqrt{h^2+k^2+l^2}} = \frac{4}{\sqrt{2^2+2^2+2^2}}$$

$$= 1.155A^0$$

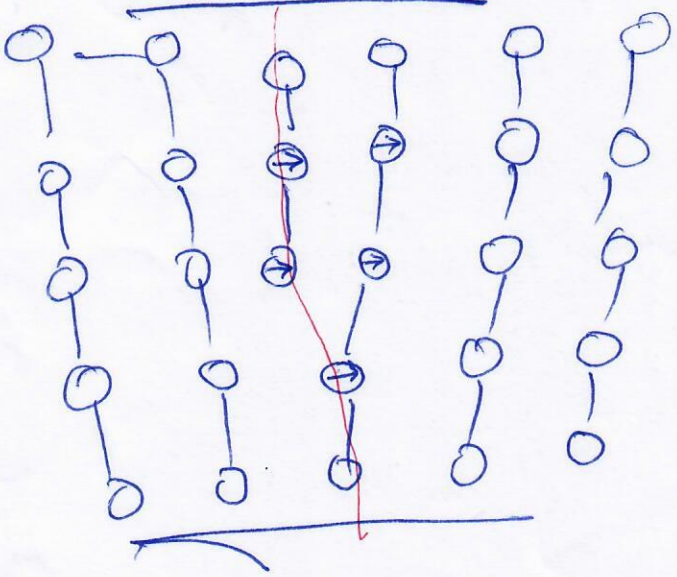
$\vec{b}$ is $\vec{b}$ in [111] direction and in $1.155A^0$ length.



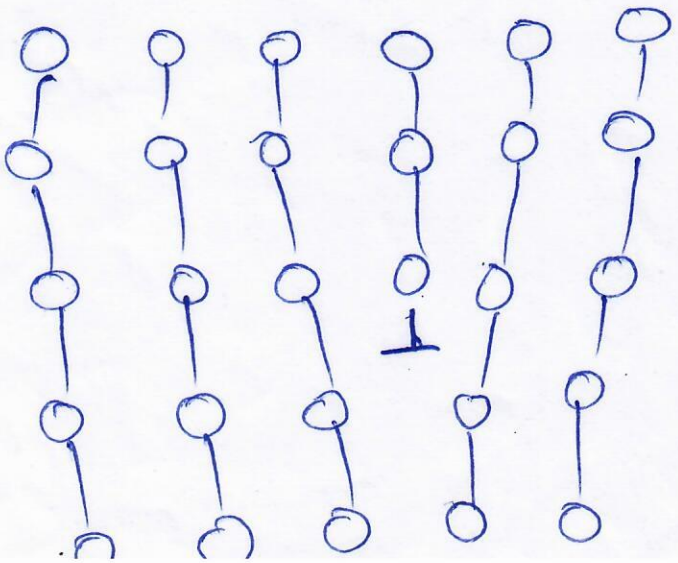
Shear Stress Mechanism



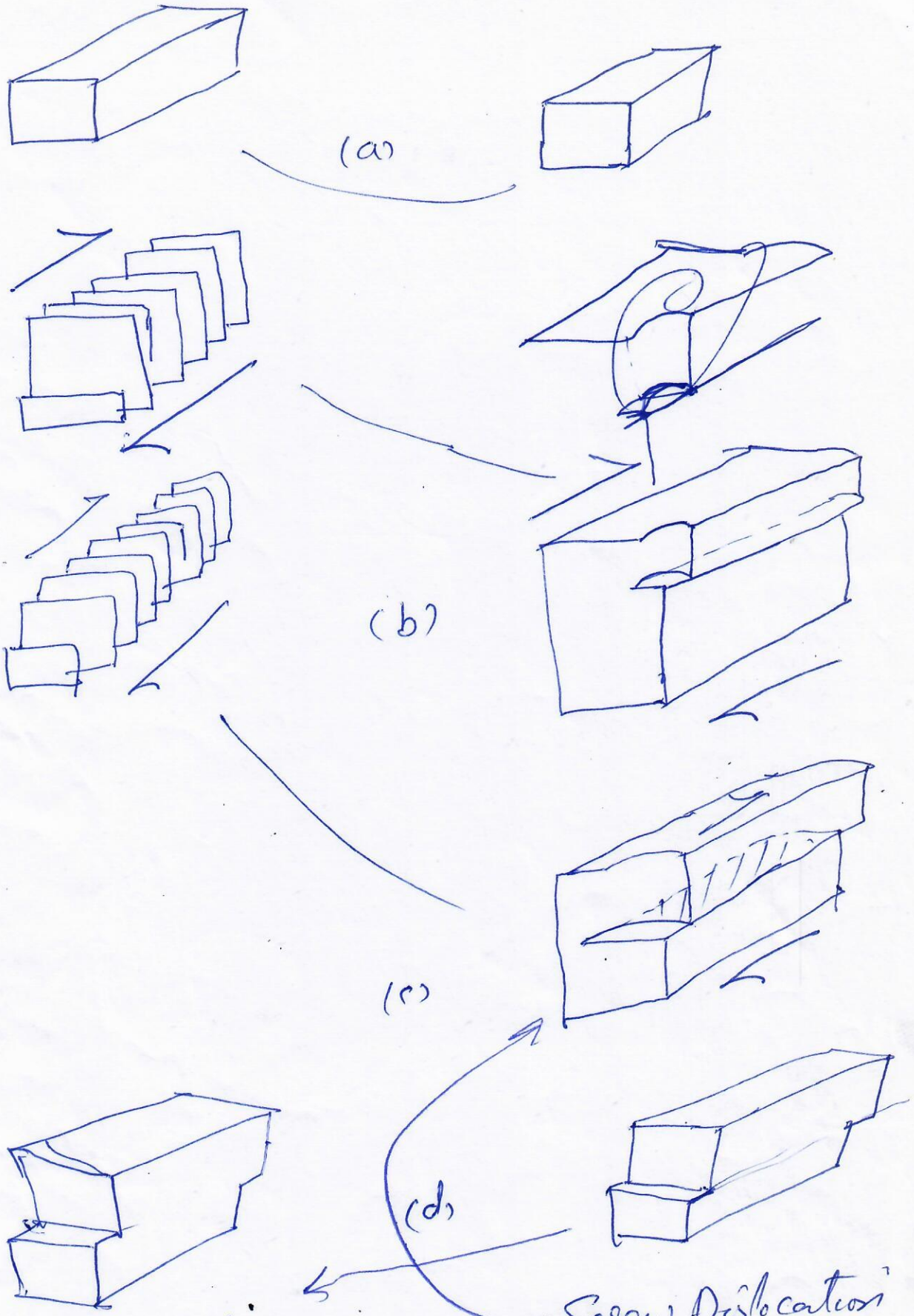
(a)



(b)



when a shear force is applied to the dislocation in (a), the atoms are displaced (b), Untill the dislocation's move one Burgers vector in the slip direction (c).



A shear force acting on a dislocation introduced