

Alloying and Deformation



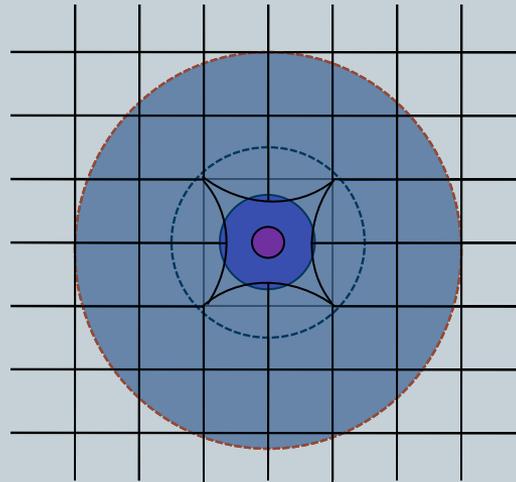
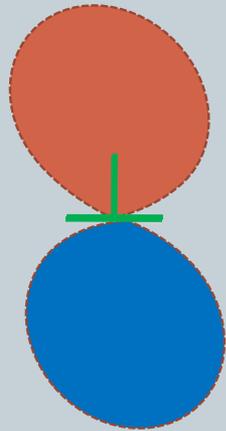
REVIEW LECTURE

11/2/09

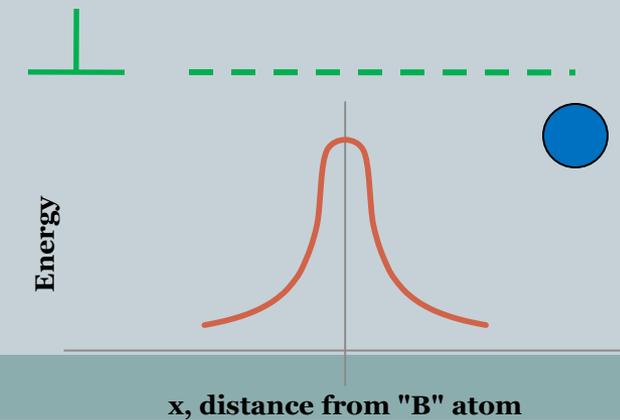
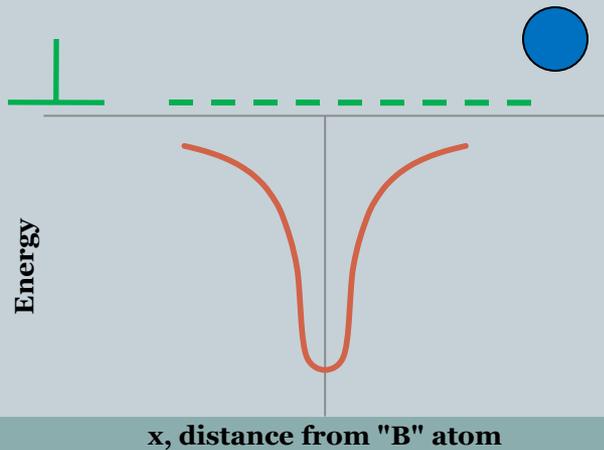
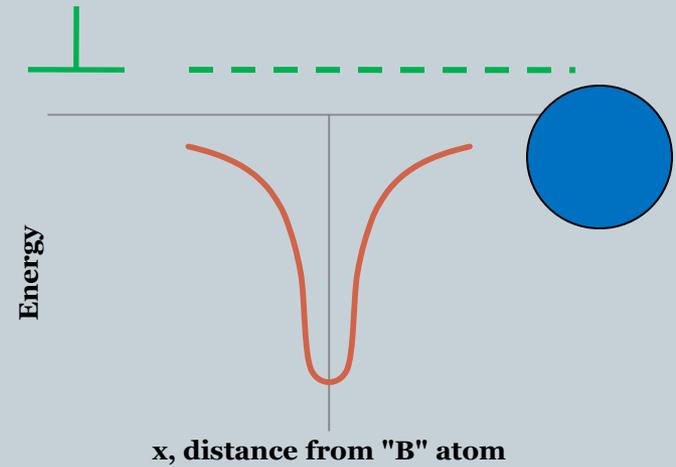
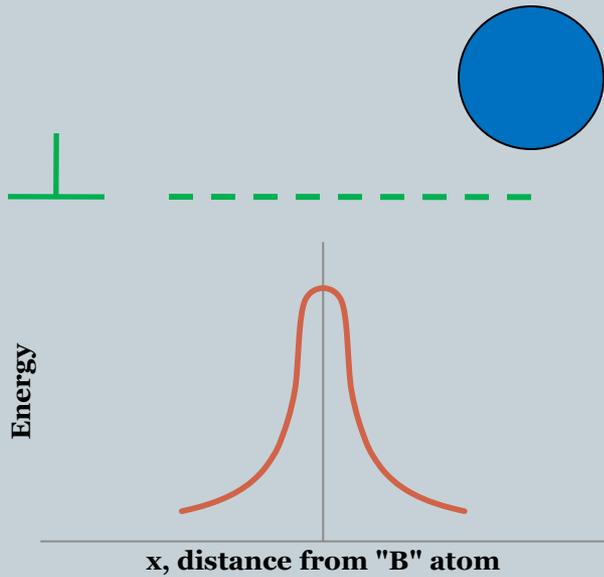
What were we talking about again?



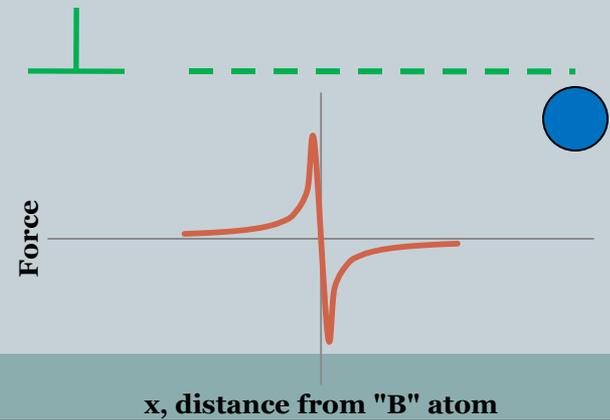
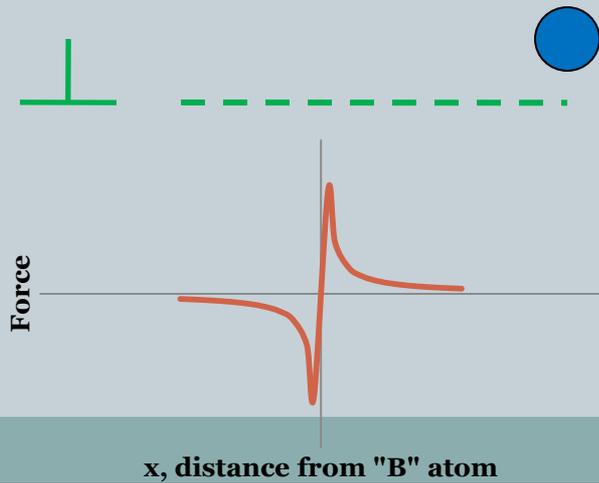
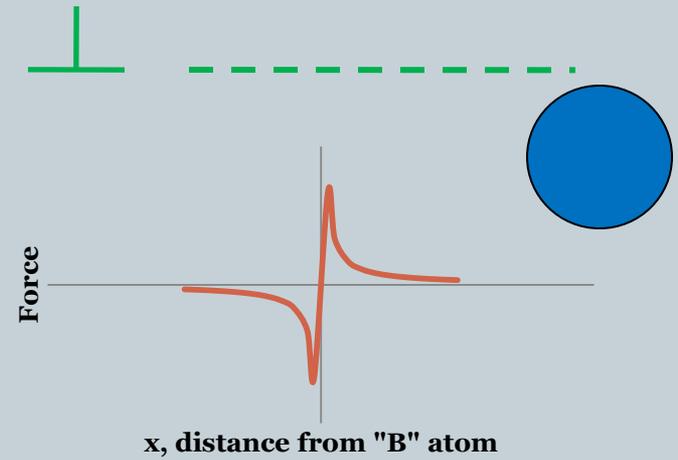
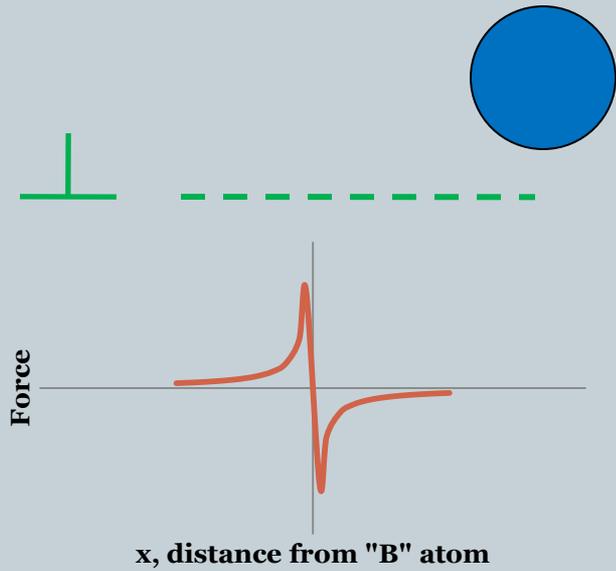
- Single phase random solid solution
- How does “B” atom talk to dislocations
- Calculate σ_y of an alloy



Energy felt by Dislocation



Force on the Dislocation



Conclusions



- **Hydrostatic pressure:**

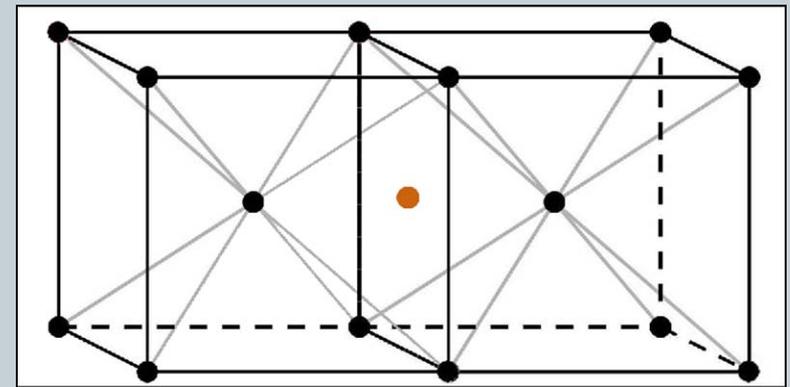
- Only Edge interacts
- Found in cubic structures
- Weak effect: 10-100 MPa

$$U_{\text{int}} = \frac{4(1+\nu)\mu b}{3(1-\nu)} (\epsilon_v r_A^3) \left(\frac{\sin \theta}{r} \right)$$

Interaction Energy Volume change Coordinates

- **Non-hydrostatic pressure:**

- Create shear/deviatoric stresses
- Caused by asymmetry
 - ✦ Crystal structure (HCP)
 - ✦ Interstitials
- Interact with Screw component
- Strong effect: 100-500 MPa



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