3.40J / 22.71J
Modern Physical Metallurgy

KJ Van Vliet and KC Russell

Lecture 8: Dislocation interactions III

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General formulation of Peach-Kohler:

If $|\mathbf{b} \bullet \Sigma \times \mathbf{g}| > f$, a dislocation will move if and only if:

…there exists an available slip system

Q: What happens if a full dislocation cannot move?

LECTURE 8

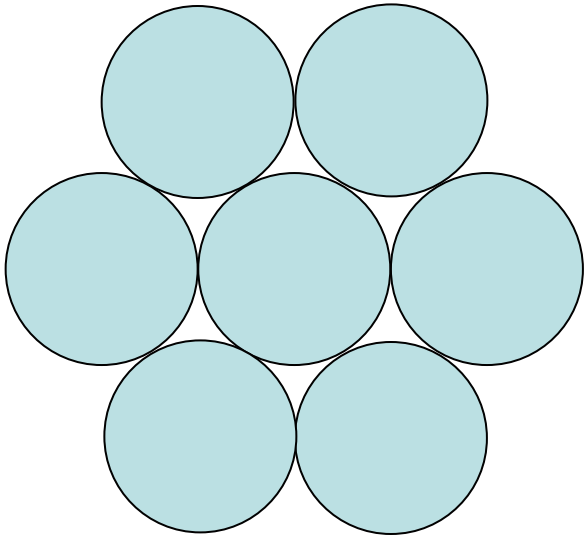
Q: What happens when 2 moving dislocations intersect?

Q: What happens when a lot of dislocations interact?

LECTURE 9

Q: What happens if a full dislocation cannot move?

1. Partial dislocations



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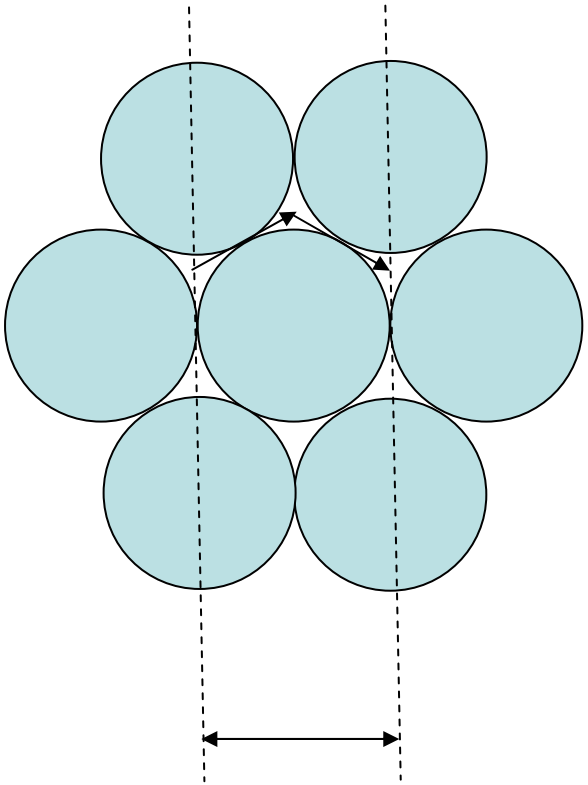
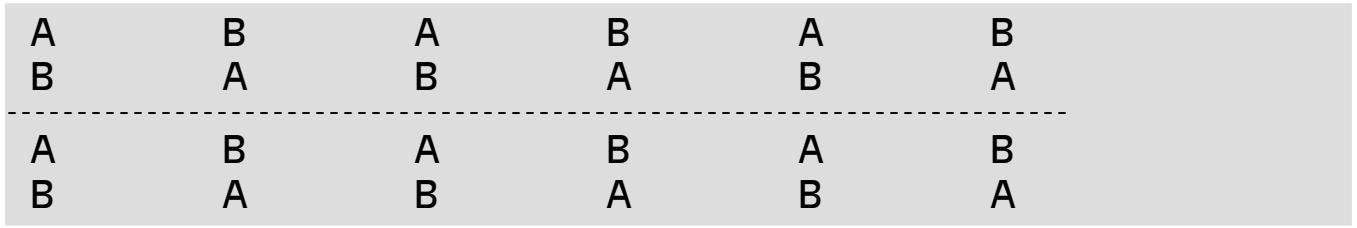
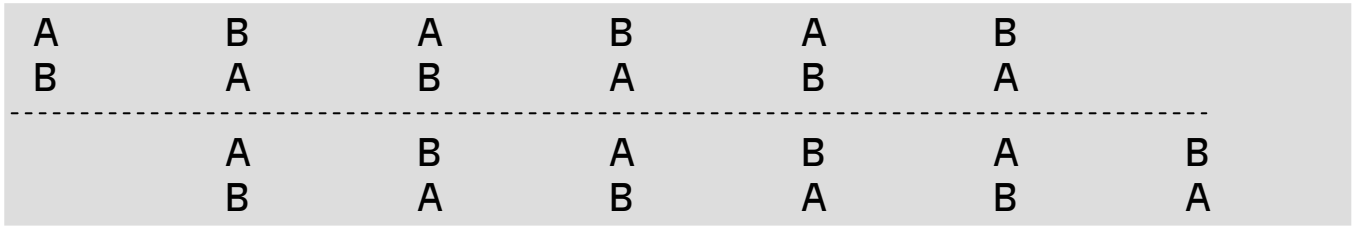
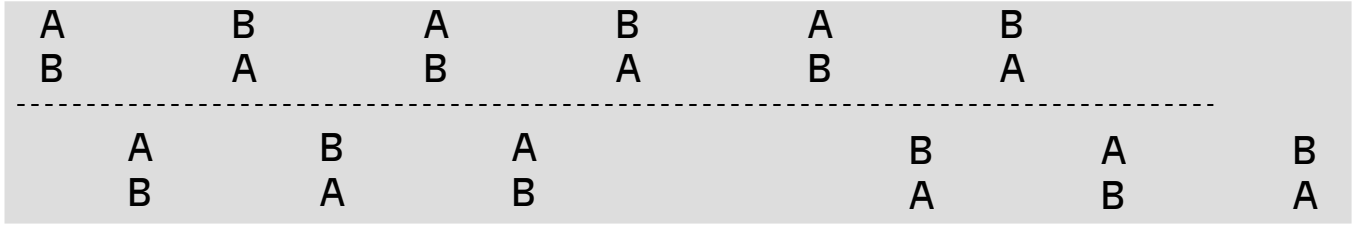
PARTIALS AND STACKING FAULTS

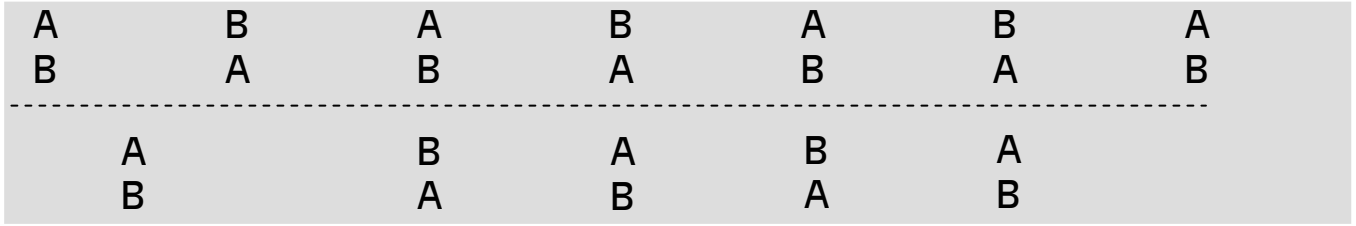


PARTIALS AND ANTIPHASE BOUNDARIES

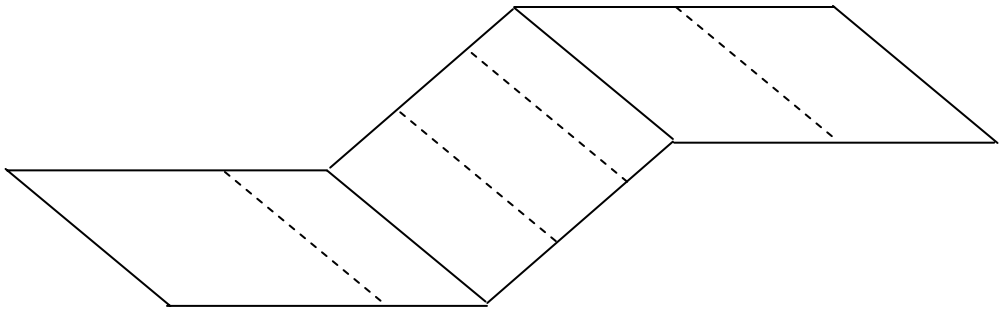








2. CROSS-SLIP



2. CLIMB

Edge dislocations cannot cross-slip due to defined slip plane,
ie, $b \perp \xi$.

If they cannot move in their slip plane, one option is to climb.

CLIMB = movement of vacancy row in one direction, so that the half-plane advances normal to the slip plane (up or down).

Requires collective motion of vacancy line, so favored only at

- elevated temperature
- elevated pressure.