(200 points)

Triple Junctions

Problem 1: A piece of paper lithosphere has been cut into three pieces A, B, and C in different ways. In all cases the paper plates have the velocity diagram shown below. All of the angles shown are multiples of 45°.

(a) Show whether the plate boundaries are ridges, trenches, or transforms.
(b) Draw a pair of arrows on opposite sides of each boundary showing the direction of relative motion (note that these arrows need not be perpendicular to ridges and trenches).
(c) Show the magnitude of the relative velocity across each boundary in mm/yr. Hint: If you have trouble visualizing the motion, hold plate B fixed and draw the velocity fields over plates A and C.
Problem 2: The plates are now moving as shown below. Proceed as with Problem 1.

Velocity diagram for Problem 2.
**Problem 3:** Make a velocity diagram for each set of plates and determine whether the dashed boundary is a ridge, transform, or trench; then show the relative velocity across the boundary, giving both the direction (small arrows) and the magnitude (in units of mm/yr).

![Velocity diagrams](image)

**Problem 4:** For Problems 1-3, evaluate each triple junction in velocity space to determine if the triple junctions are stable. For the stable triple junctions, determine the velocity vector of the triple junction relative to plate C.