

2. LISSAJOUS BRIDGE (6 points) — Jaan Kalda.

A circuit has four nodes A , B , E , D . An AC source of amplitude V is applied between A and E . A resistor R_1 connects A to B and a capacitor C connects B to E ; a resistor R_2 connects A to D and an inductor L connects D to E . A potentiometer with a sliding contact P is connected between A and E . The voltage between P and B feeds the x -input of an oscilloscope, and the voltage between P and D feeds the y -input; both input channels have the same gain. The oscilloscope plots the voltage V_x from the x -input and the voltage V_y from the y -input in the V_x - V_y -plane. The position of the sliding contact P is

adjusted until the figure on the screen degenerates into a line segment. It appears that in that case, the line segment makes an angle α with the x -axis, and the sliding contact P divides the potentiometer's length in the ratio $1 : 2$ from left to right in the figure. Find the amplitude of the voltage between B and P .

