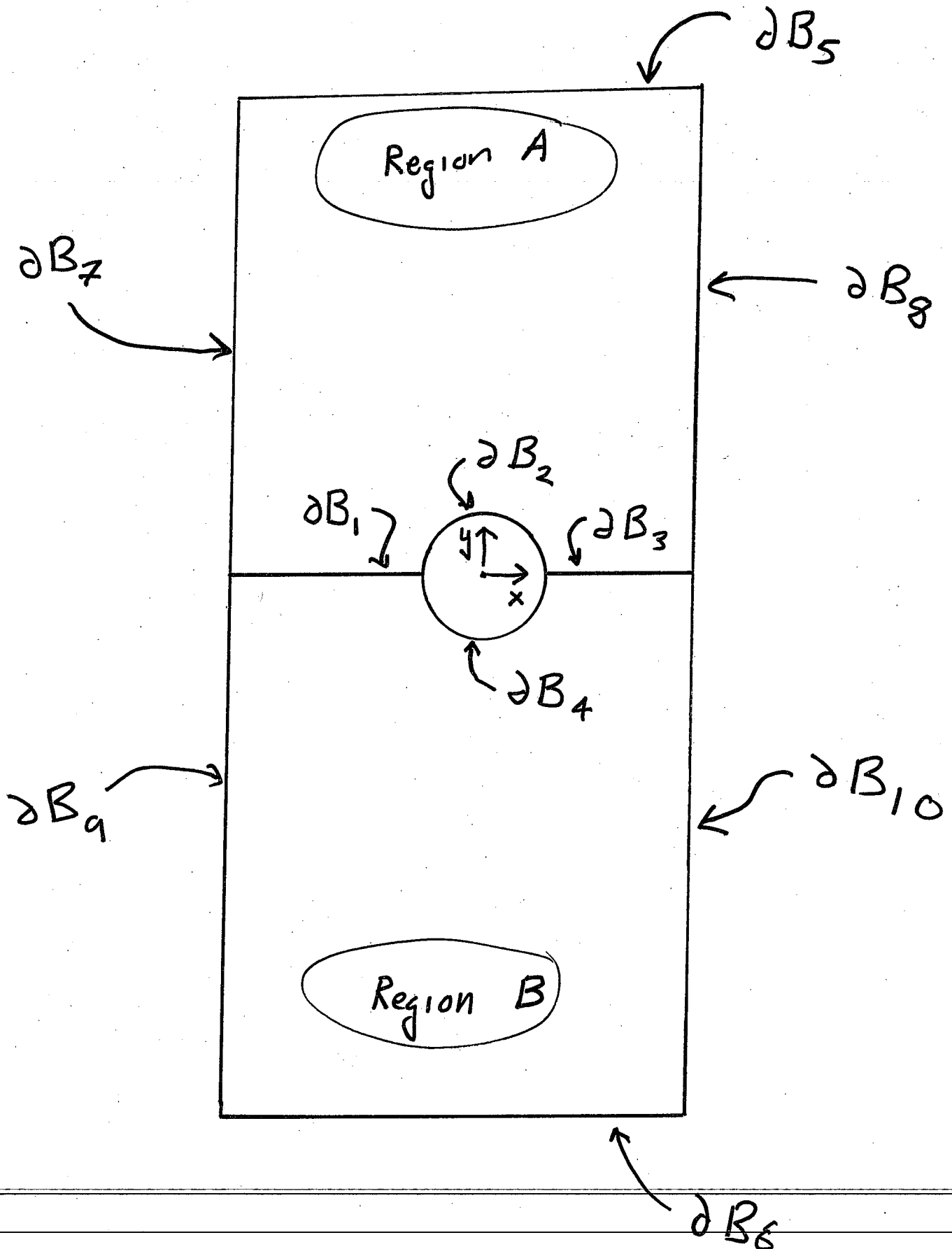


# 2D Vector field



PDE

$$\left. \begin{array}{l} \nabla \times \bar{P} = 0 \\ \nabla \cdot \bar{P} = 0 \end{array} \right\} \text{ in regions } A \text{ \& } B$$

BC

$$\textcircled{1} \quad \bar{P}|_{\partial B_5} = 0$$

$$\textcircled{2} \quad \bar{P}|_{\partial B_6} = 0$$

$$\textcircled{3} \quad \bar{P}|_{\partial B_7} = \bar{P}|_{\partial B_8}$$

$$\textcircled{4} \quad \bar{P}|_{\partial B_9} = \bar{P}|_{\partial B_{10}}$$

$$\textcircled{5} \quad \bar{a}_n \cdot \bar{P}|_{\partial B_2} = f(x, y)$$

$$\textcircled{6} \quad \bar{a}_n \cdot \bar{P}|_{\partial B_4} = g(x, y)$$

$$\textcircled{7} \quad \bar{a}_n \cdot (\bar{P}_A - \bar{P}_B)|_{\partial B_1} = C_1$$

$$\textcircled{8} \quad \bar{a}_n \cdot (\bar{P}_A - \bar{P}_B)|_{\partial B_3} = C_2$$

$$\textcircled{9} \quad \bar{a}_n \times [\bar{P}_A - \bar{P}_B]|_{\partial B_1} = C_3 \bar{a}_z$$

$$\textcircled{10} \quad \bar{a}_n \times [\bar{P}_A - \bar{P}_B]|_{\partial B_3} = C_4 \bar{a}_z$$