NAME

Fluids-ID

Quiz 5. The two-dimensional velocity field near a stagnation point (see figure) is given by

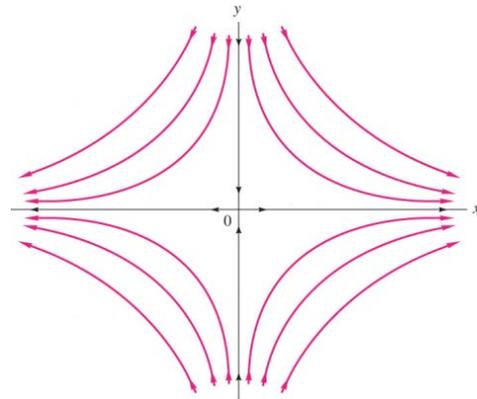$$u = \frac{U_0 x}{5L} \qquad v = -\frac{U_0 y}{5L}$$

where U_0 = 15 m/s and L = 2 m are constants. At (x, y) = (3 m, 3 m), compute the (a) velocity (u, v), (b) local acceleration $(a_{x,\text{local}}, a_{y,\text{local}})$, and (c) convective acceleration $(a_{x,\text{conv}}, a_{y,\text{conv}})$ and (d) the magnitude of the total acceleration, $|\underline{a}|$.

Acceleration:

$$a_x = \frac{\partial u}{\partial t} + u\frac{\partial u}{\partial x} + v\frac{\partial u}{\partial y}$$

$$a_y = \frac{\partial v}{\partial t} + u\frac{\partial v}{\partial x} + v\frac{\partial v}{\partial y}$$

Note: Attendance (+2 points), format (+1 point)