$$\frac{\partial u'}{\partial t} + U\frac{\partial u'}{\partial x} + v'\frac{dU}{dy} - fv' = -\frac{1}{\rho}\frac{\partial p'}{\partial x}$$

$$\frac{\partial v'}{\partial t} + U\frac{\partial v'}{\partial x} + fu' = -\frac{1}{\rho}\frac{\partial p'}{\partial y}$$

$$\frac{\partial u'}{\partial x} + \frac{\partial v'}{\partial y} = 0$$