

$$\int_{-1}^0 \frac{\partial}{\partial s} (H_0 \Omega) ds = \left[ H_0 \Omega \right]_{s=0}^0 - \left[ H_0 \Omega \right]_{s=-1}^0 = 0 - 0 = 0$$

$$\Omega(s=0) \equiv 0$$

$$\Omega(s=-1) \equiv 0$$

therefore

$$\boxed{\frac{\partial}{\partial t} \left( \frac{\rho}{mn} \right) + \frac{\partial}{\partial \xi} \left( \frac{D\bar{u}}{n} \right) + \frac{\partial}{\partial \eta} \left( \frac{D\bar{v}}{m} \right) = 0} \quad (5.6)$$

or

$$\boxed{\frac{\partial}{\partial t} \left( \frac{D}{mn} \right) + \frac{\partial}{\partial \xi} \left( \frac{D\bar{u}}{n} \right) + \frac{\partial}{\partial \eta} \left( \frac{D\bar{v}}{m} \right) = 0} \quad (5.7)$$