for fig.

$$\left(\frac{dz}{dy}\right)_\theta = \frac{f\frac{\partial U_g}{\partial z}}{\frac{g}{\theta}\frac{\partial \theta}{\partial z}}$$

near trap

$\frac{\partial U_g}{\partial z} \to 0$

$\frac{\partial \theta}{\partial z} \to$ large

$$\left(\frac{dz}{dy}\right)_{mg} = \frac{\zeta_g + f}{\frac{\partial U_g}{\partial z}}$$

$\frac{\partial U_g}{\partial z} \to 0 \Rightarrow \left(\frac{dz}{dy}\right)_{mg} \to \infty$

parcel (tube)

env.

$$\frac{Dv}{Dt} = -f(m - m_g)$$

$$\frac{Dw}{Dt} = \frac{g}{\bar{\theta}}(\theta' - \bar{\theta})$$

env.

parcel (tube)

$$\frac{\partial U_g}{\partial z} \approx -\frac{g}{f\theta}\frac{\partial \theta}{\partial y}$$