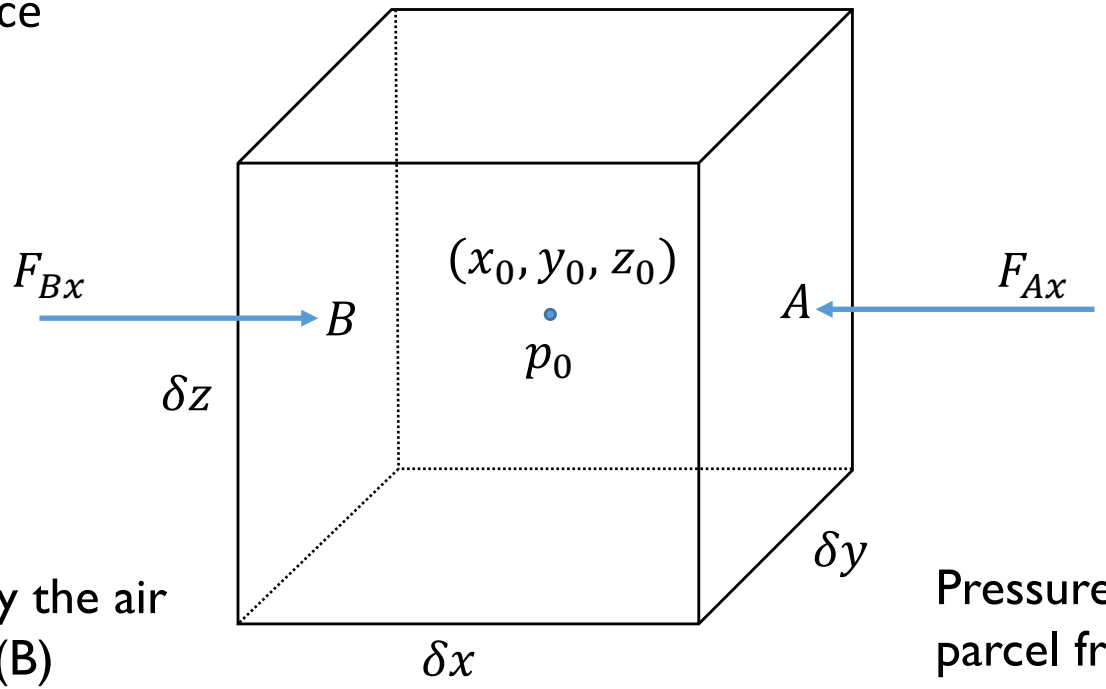
Pressure gradient force
(Ch. 1.2.1)



Pressure force felt by the air parcel from the left (B)

$$F_{Bx} = + \square \, \delta y \delta z$$

Pressure force felt by the air parcel from the right (A)

$$F_{Ax} = - \square \, \delta y \delta z$$

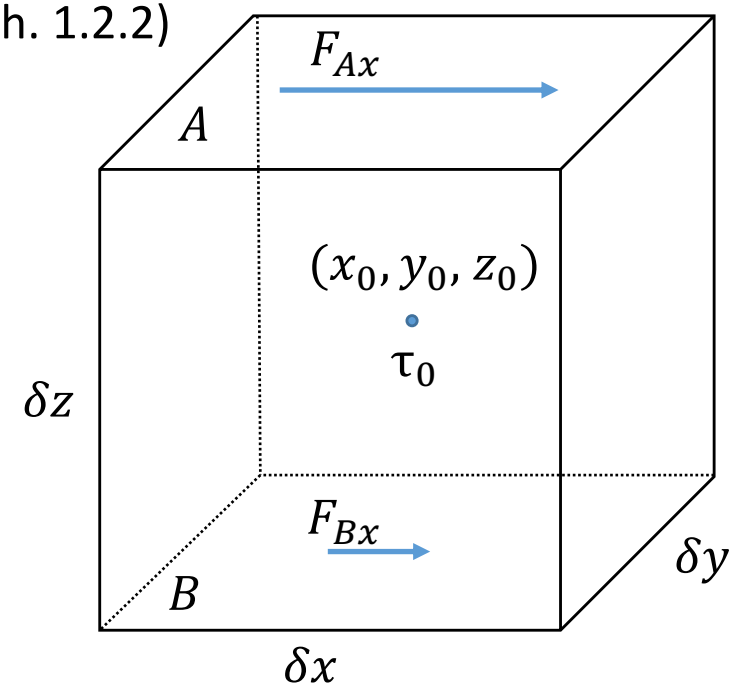
Net pressure force (x-direction)

$$F_x = \square = \square$$

Net pressure force per unit mass

$$\frac{F_x}{\delta m} = \square = \square$$

Viscous force
(Ch. 1.2.2)



- Shear stress

$$\tau = \mu \frac{\partial u}{\partial z}$$

μ: the viscosity coefficient
(kg m^{-1} s^{-1})

- Viscous force

= shear stress per unit area
x area $F_r = \tau A$

Viscous force felt by the air parcel from the top (A)

$$F_{Ax} = + \square \, \delta x \delta y$$

Viscous force felt by the air parcel from the bottom (B)

$$F_{Bx} = \square$$

Net viscous force

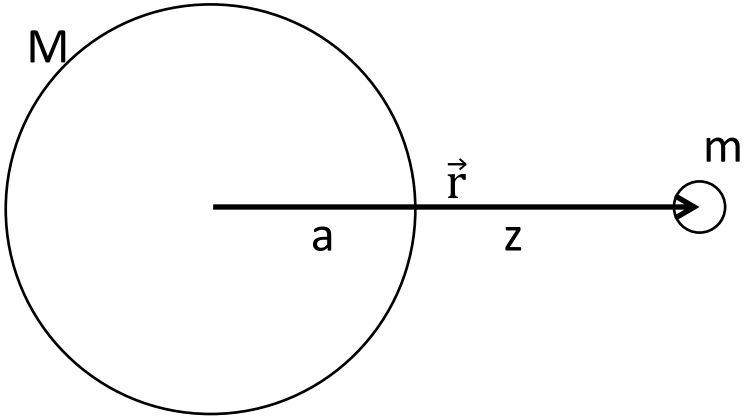
$$F_{xz} = \square = \square$$

Net pressure force per unit mass

$$\frac{F_{xz}}{\delta m} = \square = \square = \square$$

$\nu \equiv \mu/\rho$ is kinematic viscosity coefficient (=1.46 x 10^{-5} m^2 s^{-1} for standard atmospheric condition at sea level)

Gravitational force
(Ch. 1.2.3)



G: gravitational constant (=6.673 x 10^{-11} N m^2 kg^{-2})
M: mass of object 1 (Earth)
m: mass of object 2 (an air parcel)
$\vec{r}$: a vector directed from the center of mass of object 1 toward the center of mass of object 2
$r = |\vec{r}|$: distance from object 1 to object 2
a: radius of Earth

Gravitational force

$$\overrightarrow{F_g} = -\frac{GMm}{r^2}\left(\frac{\vec{r}}{r}\right)$$

Gravitational force per unit mass

$$\frac{\overrightarrow{F_g}}{m} \equiv \overrightarrow{g^*} =$$

at Sfc $\quad \overrightarrow{g_0^*} =$

a: the mean radius of the Earth

$$r = a + z \approx$$

$$\overrightarrow{g^*} \approx$$