

Eq. 4-11

Assumption:

X = Downward flux = Particulate deposition + Surface attachment

Y = Upward flux = Y' + C<sub>up</sub>

Y' = Particulate upflow + Surface attachment

C<sub>up</sub> = Modification coefficient of upward flux

Thus, Robs can define as:

$$\begin{aligned}
 Robs &= \frac{X}{Y} = \frac{X}{Y' + C_{up}} \\
 \Rightarrow Robs &= \frac{X}{Y'} \times \frac{1}{\left(1 + \frac{C_{up}}{Y'}\right)}; & \because Re\ st = \frac{X}{Y'} \\
 \Rightarrow \frac{Re\ st}{Robs} &= 1 + \left(\frac{C_{up}}{Y'}\right) \\
 \Rightarrow \frac{Re\ st}{Robs} &= 1 + \left(\frac{C_{up}}{Y - C_{up}}\right); & \because Y = Y' + C_{up} \\
 \Rightarrow \frac{Re\ st}{Robs} &= 1 + \frac{C_{up}}{C_{up}} \times \left(\frac{1}{\left(\frac{Y}{C_{up}}\right) - 1}\right) \\
 \Rightarrow \frac{Re\ st}{Robs} - 1 &= \left(\frac{1}{\left(\frac{Y}{C_{up}}\right) - 1}\right) \\
 \Rightarrow \frac{Y}{C_{up}} - 1 &= \frac{1}{\left(\frac{Re\ st}{Robs}\right) - 1} \\
 \Rightarrow \frac{Y}{C_{up}} &= \frac{1}{\left(\frac{Re\ st}{Robs}\right) - 1} + 1 \\
 \Rightarrow C_{up} &= \frac{Y}{\frac{1}{\left(\frac{Re\ st}{Robs}\right) - 1} + 1}; & \because Y = \text{Upward flux} \\
 \Rightarrow C_{up} &= \frac{\text{Upward flux}}{\frac{1}{\left(\frac{Re\ st}{Robs}\right) - 1} + 1} \dots\dots (Eq.4 - 11)
 \end{aligned}$$