

Given: $D = f(\alpha, \rho, V, \mu, b, c)$

or $g(D, \alpha, \rho, V, \mu, b, c) = 0$

Parameter	Units
D	mlt^{-2}
α	m^{-3}
ρ	ml^{-3}
V	lt^{-1}
μ	$ml^{-1}t^{-1}$
b	l
c	l

$$N = 7$$

$$K = 3$$

$$\rightarrow 7 - 3 = 4 \text{ Pi products.}$$

$$\pi_1 = \frac{D}{\frac{1}{2}\rho V^2 bc} \equiv C_D$$

$$\pi_2 = \alpha \equiv \alpha$$

$$\pi_3 = \frac{\rho Vc}{\mu} \equiv Re$$

$$\pi_4 = \frac{b}{c} \equiv R \text{ (aspect ratio)}$$

$$\text{So } C_D = \bar{f}(\alpha, Re, R)$$

Alternative Pi products:

$$\pi_1 = \frac{D}{\frac{1}{2}\rho V^2 b^2} = \frac{C_D}{R}$$

$$\pi_3 = \frac{\rho Vb}{\mu} = Re \cdot R$$

$$\pi_4 = \frac{c}{b} = \frac{1}{R}$$

etc.

These are valid alternative parameters which determine C_D , although a bit unconventional