

Soal Analisis Dimensi

$$(a) \boxed{P = W^a l^b \rho^c} \rightarrow \frac{ML^2}{T^3} = \left(\frac{ML}{T^2}\right)^a (L^b) \left(\frac{M}{L^3}\right)^c$$

$$P \rightarrow ML^2 T^{-3}$$

$$W \rightarrow ML T^{-2}$$

$$\rho \rightarrow ML^{-3}$$

$$l \rightarrow L$$

$$= \frac{M^a L^a}{T^{2a}} \cdot L^b \cdot \frac{M^c}{L^{3c}}$$

$$\frac{ML^2}{T^3} = \frac{M^{(a+c)} L^{a+b-3c}}{T^{2a}}$$

$$a+c=1 \rightarrow c=1-\frac{3}{2} = \boxed{-\frac{1}{2}=c}$$

$$a+b-3c=2 \rightarrow b=2-\frac{3}{2}+\frac{3}{2} = \boxed{-1=b}$$

$$3=2a \rightarrow \boxed{a=\frac{3}{2}}$$

Diperoleh $P = W^{1.5} l^{-1} \rho^{-0.5}$

$$(b) P = (2w)^{3/2} \rho^{-1/2} l^{-1}$$

$$= \sqrt{2}^3 w^{3/2} \rho^{-1/2} l^{-1}$$

$$\underline{P = \sqrt{2}^3 \cdot P_0}$$