

PARTE AUX #9

P1) a) Variables: ρ, μ, g, h, a, d, V ; $n=7$; $r=3 (M, L, T) \Rightarrow 7-3=4$ adimensionales
Matriz de dimensiones:

	ρ	μ	g	h	a	d	V	
M	1	1	0	0	0	0	0	$\pi_1 (V, g, h)$
L	-3	-1	1	1	1	1	1	$\pi_2 (V, d, \rho, \mu)$
T	0	-1	-2	0	0	0	-1	$\pi_3 (a, h)$
								$\pi_4 (d, h)$

$$\pi_1 = Fr = \frac{V}{\sqrt{gh}}; \pi_2 = Re = \frac{Vd}{\mu/\rho} = \frac{Vd\rho}{\mu}; \pi_3 = \frac{a}{h}; \pi_4 = \frac{d}{h}$$

$$\Rightarrow \phi(\pi_1, \pi_2, \pi_3, \pi_4) = 0 \Rightarrow \phi(Fr, Re, \frac{a}{h}, \frac{d}{h}) = 0 \Rightarrow \frac{V}{\sqrt{gh}} = \phi\left(\frac{Vd\rho}{\mu}, \frac{a}{h}, \frac{d}{h}\right)$$

b)

π_1	π_2	π_3	π_4
1.414	19.800	0.5	0.05
1.414	28.000	0.5	0.025
1.415	34.300	0.5	0.017
1.411	48.400	0.333	0.067
1.414	62.600	0.4	0.04
1.413	74.000	0.429	0.029

$$\frac{V}{\sqrt{gh}} = cte = \sqrt{2} \Rightarrow V = \sqrt{2gh}$$

c) $\lambda_L = \frac{L_P}{L_m} = 50$. Fca predominante: Gravedad $\Rightarrow F = mg \Rightarrow \lambda F = \lambda m \cdot \lambda a$

La gravedad es la misma en el prototipo y en el modelo $\Rightarrow \lambda a = 1$

$$\lambda a = \frac{\lambda L}{\lambda^2} = 1 \Rightarrow \lambda L = \lambda^2 \Rightarrow 50 = \lambda^2 \Rightarrow \lambda_T = \sqrt{50} = \frac{T_P}{T_m}$$

$$\Rightarrow T_P = \sqrt{50} \cdot T_m = \sqrt{50} \cdot 15 = 106 \text{ minutos}$$