Barometric formula @model

@wikipedia

Motivation

Ideal Gas Static Vertical Pressure Variation

Output

$p(z)$	Fluid pressure p

Input

z	Elevation	ρ_0	Fluid density at Logging reference point z_0
z_0	Logging reference point (usually at surface)	c_0	Fluid Compressibility at Logging reference point z_0
g	Standard gravity constant		

Equation

(1) $$p(z) = p_0 \cdot \exp\left[-\frac{\rho_0 \, g}{p_0} \cdot (z - z_0)\right]$$

where

z	Elevation	p_0	Gas pressure at Logging reference point z_0
z_0	Logging reference point (usually at surface)	ρ_0	Gas density at Logging reference point z_0
g	Standard gravity constant	c_0	Gas Compressibility at Logging reference point z_0

Alternative form

(2) $$p(z) = p_0 \cdot \exp\left[-\frac{M}{RT} \cdot (z - z_0)\right]$$

where

z	Elevation	p_0	Gas pressure at Logging reference point z_0
z_0	Logging reference point (usually at surface)	M	Gas molar mass
g	Standard gravity constant	T	Gas temperature
		R	Gas constant

Following Ideal Gas Equation of State:

(3) $$\frac{\rho_0}{p_0} = \frac{M}{RT}$$

See also

Physics / Mechanics / Continuum mechanics / Fluid Mechanics / Fluid Statics

[Fluid Dynamics]