

Pressure Profile in GC-proxy static fluid column @model

Motivation

Proxy model of [Pressure Profile in Homogeneous Steady-State Pipe Flow @model](#) in the form of [algebraic equation](#) for fast computation.

Outputs

$p(l)$	Pressure distribution along the pipe
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Inputs

T_0	Intake temperature	$T(l)$	Along-pipe temperature profile
p_0	Intake pressure	$\rho(T, p)$	Fluid density
$z(l)$	Pipeline trajectory TVDss	$\mu(T, p)$	Fluid viscosity
$\theta(l)$	Pipeline trajectory inclination , $\cos \theta(l) = \frac{dz}{dl}$	A	Pipe cross-section area

Assumptions

Steady-State flow	Quasi-isothermal flow
$\frac{\partial p}{\partial t} = 0$	$\frac{\partial T}{\partial t} = 0 \rightarrow T(t, l) = T(l)$
Homogenous flow	Constant cross-section pipe area A along hole
$\frac{\partial p}{\partial \tau_x} = \frac{\partial p}{\partial \tau_y} = 0 \rightarrow p(t, \tau_x, \tau_y, l) = p(l)$	$A(l) = A = \text{const}$
Constant inclination	Linear density
$\theta(l) = \theta = \text{const} \rightarrow \cos \theta = \frac{dz}{dl} = \text{const}$	$\rho = \rho^* \cdot (1 + c^* \cdot p)$

Equation

Pressure profile in static fluid column, no flow: $\dot{m} = 0, q_0 = 0$	$(1) \quad p(L) = \frac{1}{c^*} \cdot [-1 + (1 + c^* p_0) \cdot \exp(c^* \rho^* G L)]$	$(2) \quad p(L) = p_0 + \frac{1}{c_0} \cdot [-1 + \exp(c_0 \rho_0 G L)]$
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where

$G = g \cdot \cos \theta$	gravity acceleration along pipe
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See ...

See also

[Physics / Fluid Dynamics / Pipe Flow Dynamics / Pipe Flow Simulation / Pressure Profile in Homogeneous Quasi-Isothermal Steady-State Pipe Flow @model](#)

[[Pressure Profile in G-Proxy Pipe Flow @model](#) / [Pressure Profile in GF-Proxy Pipe Flow @model](#)]

References