Refinement View of NoPCM

T1: Conservation of Thermal Energy

$-\nabla \cdot \mathbf{q} + g = \rho C \frac{\partial T}{\partial t}$

The definitions associated with this equation are just to define the meaning of each term, like g is the volumetric heat generation. Although it isn't in the current document, we will later need the definition of density as an equation relating density, mass and volume.

R1.1: Density

$m = \rho V$

T1.1: Simplified Rate of Change of Temperature

- Apply Assumptions: A:Constant-Water-Temp-Across-Tank, A:Density-Water-Constant-over-Volume, A:Specific-Heat-Energy-Constant-over-Volume
- Use relation R1.1
- Use Gauss's Theorem

$mC\frac{dT}{dt} = q_{\text{in}}A_{\text{in}} - q_{\text{out}}A_{\text{out}} + gV$

Later use

D1.1.1: Density of Water

$m_w = \rho_w V_w$