1 AE22B012

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1.1 Steady Flow Energy Equation

The steady flow energy equation states that for a steady mass flow, the subtraction of the rate change of heat transfer and work input (except flow work) equals the subtraction of the summation of the rate change of mass times outlet enthalpy, kinetic energy, potential energy, etc., and the summation of the rate change of mass times outlet enthalpy, kinetic energy, and potential energy. Mathematically, this equation can be represented as:

$$\frac{d(Q-W')}{dt} = \frac{dm}{dt}\left((h_e + \frac{v_e^2}{2} + gze) - (h_i + \frac{v_i^2}{2} + gzi)\right) \tag{1}$$

where:

$d(Q-W')/dt$ is the rate of change of heat transfer and work input
dm/dt is the rate of change of mass flow
h_e, v_e, gze are the outlet enthalpy, velocity, and elevation
h_i, v_i, gzi are the inlet enthalpy, velocity, and elevation

This equation describes the conservation of energy for a steady flow system, taking into account the changes in heat transfer, work, and different forms of energy along the flow path.
[1]

[1] `https://en.wikipedia.org/wiki/Flow_process`