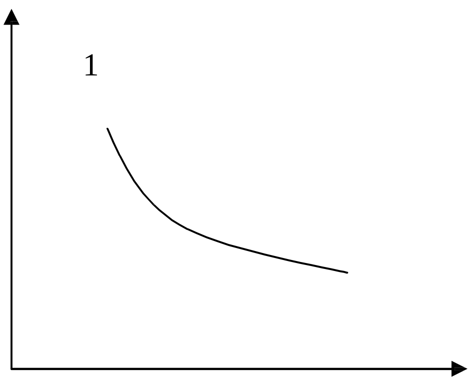
$pv^n = const$ where n is index of compression or expansdion depending on the type of process




1-2 $pv^n = p_m v_m^n = p_2 v_2^n = p_1 v_1^n$ where m is any point on the curve

Then $p = \frac{p_1 v_1^n}{v^n}$

$w = \int p\,dv = \int \frac{p_1 v_1^n}{v^n} dv = p_1 v_1^n \int v^{-n} dv = p_1 v_1^n \left[\frac{v_2^{1-n} - v_1^{1-n}}{1-n}\right]$ But $p_1 v_1^n = p_2 v_2^n$

Then $w = \frac{p_1 v_1 - p_2 v_2}{n-1}$

But 1st law state that q-w=du then

$q - \left(\frac{p_1 v_1 - p_2 v_2}{n-1}\right) = du$

---

This equation is applicable to all values of n except where n=1 where a constant temperature process may happen and this is called isothermal process or hyperbolic process where the work done can be derived as

$$w = \int_1^2 p\,dv = c\int \frac{dv}{v} = pv \ln\frac{v_2}{v_1}$$

5.2.4 adiabatic process q=0 or Q=0

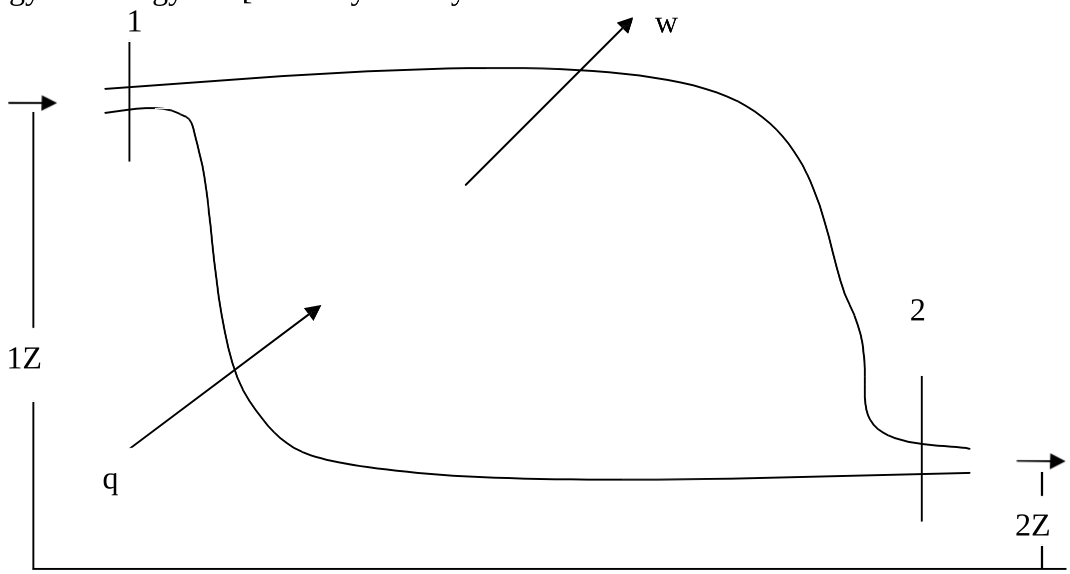
then q-w=du

w=-du
0pdv+du=
0dh=
2=h1then h
Isothermal process5.2.5
0 then du=0 It is a process where dT=
q-w=du
then

q=w

## open system5.3

for any system
[Energy in=Energy out [in steady state system




$$q + flowwork_{in} + (potential + kinetic + \text{int}\,ernal)Energy_{in} =$$
$$w + flowwork_{out} + (potential + kinetic + \text{int}\,ernal)Energy_{out}$$

Then for steady state the flow energy equation is

$$q + u_1 + p_1v_1 + \frac{c_1^2}{2} + gz_1 = w + u_2 + p_2v_2 + \frac{c_2^2}{2} + gz_2 \qquad ****$$

But $h = u + pv$ then

$$q + h_1 + \frac{c_1^2}{2} + gz_1 = w + h_2 + \frac{c_2^2}{2} + gz_2 \qquad *****$$

The two equations above are usually referred to as S.F.E.E (i.e steady flow energy
equation where
(q-heat(J/kg
(2p-pressure(N/m
(/kg3v-spesific volume(m