

熱力學試題

1. 試繪出一簡單冷凍循環示意圖
2. 試繪出液態水與水蒸汽之溫度容積圖
3. 若 $PV^n = \text{常數}$ ，且 $n \neq 1$

試問 $\int_1^2 P dV = \frac{(\quad)}{1-n}$

4. 比熱等容及等壓過程時不同試說明之，另在理想氣體的狀況下 $C_{p0} - C_{v0} = (\quad)$

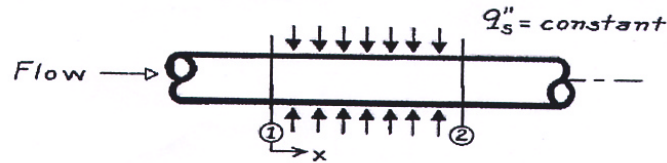
5. 熱力學第二及第三定律分別為何? 試述之
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1. (20%) Consider flow in a circular tube. Within the test section length (between 1 and 2) a constant heat flux q''_s is maintained.

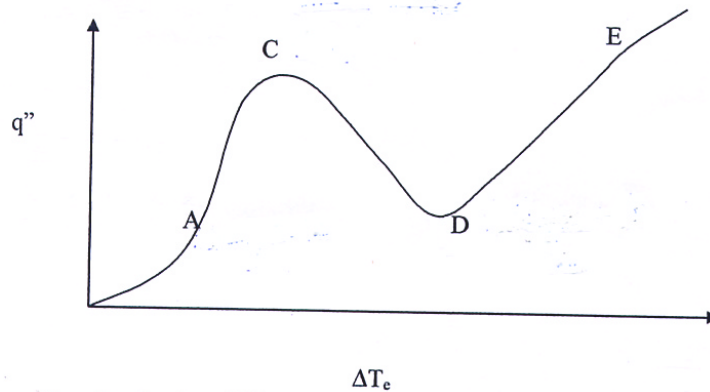
(a). For the following two cases, sketch the surface temperature $T_s(x)$ and the fluid mean temperature $T_m(x)$ as a function of distance along the test section x . In case A flow is hydrodynamically and thermally fully developed. In case B flow is not developed.

(b). Assuming that the surface flux q''_s and the inlet mean temperature $T_{m,1}$ are identical for both cases, will the exit mean temperature $T_{m,2}$ for case A be greater than, equal to or less than $T_{m,2}$ for case B? Briefly explain why.



2. (10%) Define the following no-dimensional parameters and their physical interpretation, Re, Pr, Gr, Nu. For forced convection over a flat plate, what is the **critical parameter and value** to characterize the laminar or turbulent convection? For natural convection over a vertical flat plate, what is the critical parameter and value to characterize the laminar or turbulent convection?

3. (20%) In two phase flow problem, The Nukiyama first identify different regimes of pool boiling using power-controlled heating apparatus for demonstrating the **boiling curve** as below.



Please describe the four different **boiling regimes** and their physical mechanisms, at -A, A-C, C-E, E-, and describe physical meaning of the A, C, D point