Basing a pressure recovery coefficient on the dynamic head corresponding to the average velocity at inlet, and noting that the effective area fraction is defined by:

$$E = u_{av}/U$$

at any section, the pressure recovery coefficient is:

$$C_d = \frac{(1-(E_1 A_1/E_2 A_2)^2)}{E_1^2} - \frac{(P_{0m1} - P_{0m2})}{\frac{1}{2}\rho u_{av1}^2}$$

Convergence

Using a similar procedure to that for the divergence gives a pressure drop coefficient for the converging part:

$$C_c = \frac{(1-(E_3 A_3/E_2 A_2)^2)}{E_3^2} - \frac{(P_{0m2} - P_{0m3})}{\frac{1}{2}\rho u_{av3}^2}$$

Since $A_1 = A_3$, and $u_{av1} = u_{av3}$ (by continuity), the overall pressure loss coefficient is:

$$C = C_c - C_d$$

$$= \frac{((E_1/E_3)^2 - 1)}{E_1^2} + \frac{(P_{0m1} - P_{0m3})}{\frac{1}{2}\rho u_{av1}^2}$$

$$= C_v + C_f$$

where C_v represents the effect of velocity profile distortion, and can be obtained from inlet and outlet velocity measurements, and C_f represents frictional loss, and can be obtained from total pressure measurements on the streamline of maximum total pressure.

BOOK REVIEW

Heat Transfer in Enclosures

Eds R. W. Douglas and A. F. Emery

This symposium volume is a collection of papers presented at two technical sessions at the 1984 Winter Annual Meeting of ASME. Both experimental (five papers) and analytical (eight papers) works are included covering a broad range of geometrics and practical motivations for the work. The first nine papers deal with cavities or containers of various shapes, while the remaining papers deal with annuli of one kind or another. Applications mentioned range from solar collectors to building heat transfer to electrostatic precipitator heat transfer. The session organizers believe that these papers, while certainly not an exhaustive compilation of current research, nonetheless offer a representative cross-section of the status of heat transfer in enclosures.

Contents

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