configuration was tested at a series of A_e/A_t ratios spanning the normal operating range. Each of the 5 geometrical ratios was varied over a sufficiently large range to indicate any optimum values that might exist or the general trend where such optima were not apparent.

The value of the pressure drop across the va was also varied in order to determine whether there was any dependence of performance or behaviour on Reynolds number. The effects of diffusion were tested by using varying diffuser area ratios.

The vortex amplifier was tested in a purpose built test rig. The flow was moved by a Becker 1000 blower capable of delivering up to 0.3 m^3/s (600 cfm) at pressures up to 22 kN/m^2 gauge (3 psig). Static pressure readings were made using an inclined multimanometer filled with water and the flow readings were taken from a bank of rotameters. Each rotameter was used over the mid part of its range only, to avoid the inaccuracies occurring at the extreme ends of the range. Where more than one rotameter was used in parallel, each was used in the middle of its range. Checks were made of the consistency of readings from various groups of rotameters and it was found that errors due to the parallel use of more than one rotameter were of the same order as those quoted for individual rotameters by the manufacturer (ie up to 6% of full scale).

All the readings concerning the performance of va's were made with positive gauge pressures at the inlets. The va was connected to the rig and for each configuration a set of readings of pure supply flow rate $Q_{s(Q_c=0)}$ and pure control flow rate $Q_{c(Q_s=0)}$ were taken over a range of values of ΔP from $\Delta P = 1$ iwg (1 in = 25.4 mm) to $\Delta P = 10$ iwg and then a full characteristic curve for $\Delta P = 6$ iwg was taken. To obtain the maximum information from each experiment, a record was made of the behaviour of the va throughout the characteristic as described elsewhere[18]. It was found that due to the compressing action of the Becker blower, the air warmed up and a settling period was required to permit the system to come to equilibrium. Since the blower extracted its air supply from the laboratory and the va exhausted into the laboratory, it was found that after a period of about 10 min the air in the laboratory had grown noticeably warmer and an equilibrium temperature was reached after about 10 to 15 min. It was usually found that once this equilibrium had been achieved the readings of flow rate obtained altered very little with continued running.

Values of A_e/A_t used were 0.614, 1.23, 2.5, 5.0, 10.0 (20.0).
Values of l used were 0.5, 1.0, 1.5, 2.0, 2.5.
Values of ρ used were 0.0, 0.125, 0.25, 0.375.
Values of ϕ used were 0.16, 0.22, 0.31.

BOOK REVIEW

Heat Transfer in Heat Rejection Systems

Eds S. Sengupta and Y. G. Mursalli

This volume is a compilation of 12 papers presented at the 1984 ASME Winter Annual Meeting. The papers address the general topics of heat transfer in steam power plant condensers, performance of several types of cooling towers and cooling ponds, and heat transfer from imbedded tubes in a semi-infinite medium. Included is a paper by Bartz, Johnson and Adams that discusses the results of three types of heat rejection systems, namely evaporative cooling towers, cooling lakes, and water-conserving cooling towers. The authors make clear the potential for research in these systems. Studies dealing with condenser operations examine primarily tube enhancement and biofouling based on performance and economic justification. They show that considerable gains can result from enhancement both on the water and steam sides. A new approach to monitoring biofouling is described by Characklis and Mussalli. A paper by Beckett and Davidson describes a new modelling procedure for power station condensers. The problem of modelling isolated air pockets, however, still exists.

The cooling tower studies are analytical, experimental and numerical. The paper by Majumdar, Mukerjee, Bartz and Micheletti introduces a new heat transfer model to better account for evaporative heat transfer in wet cooling towers as compared to the models of Merkel and Poppe. A numerical study by Pin and Long shows good comparison of their simulation of cooling tower plumes with four different data sets. The model is three-dimensional, but two-dimensional results only are presented.

The information presented in this volume is timely and provides interesting reading for both practising engineers and specialists developing advanced heat rejection systems. The papers are grouped to provide insight for both industrial applications and the kernel of fundamental investigations. The performance data and new modelling concepts that are introduced provide direction for the necessary developments to improve heat rejection and condensing systems.

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