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Abstract

Natural convection heat transfer to air from a bank of four horizontal aluminum cylinders vertically lined and subjected to an identical constant heat flux has been examined experimentally. Each cylinder in the bank has 30 mm outer diameter, 2 mm thickness and 400 mm in length. The investigation covered five cylinders center to center spacing (2D, 2.5D, 3D, 4D, and 5D) and five identical cylinder heat fluxes which varied the modified Rayleigh number (RaD*) from 6,1x105 to 2.0x106. The outcomes demonstrate that the local Nusselt number increases as the heat flux and cylinders center to center spacing increasing. The heat transfer results for the second, third and fourth cylinders are more down than the first cylinder heat transfer solution. The differences of the three cylinders in comparison with first cylinder are improving gradually as the cylinder center to center spacing increasing and that can be attributed to the natural convection current interaction. The temperature profile around the cylinder circumference indicates that the maximum Nusselt number occurs at θ = 0o (cylinder bottom leading edge) and the maximum surface temperature and lower Nusselt number occurs at θ =180o (top of the cylinder).. Empirical correlations were obtained for the average Nusselt

number as a function of the modified Rayleigh number. Empirical formulas by which heat transfer characteristic form each individual cylinder in the array evaluated and listed in comparison with first cylinder showing the effect of cylinder center to center spacing.

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Index Terms

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Keywords

Natural Convection, horizontal cylinders array vertically line up, cylinder center to center spacing.