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### The Effects of the Flow Resistance of Nozzle Type Fluidic Diodes on the Discharge Characteristics of an Oil Feeder Pump

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This paper concerns the effects of the flow resistance of nozzle type fluidic diodes on the discharge characteristics of an oil feeder pump for a horizontal type compressor. This pump replaces the conventional valves by fluidic diodes. These fluidic diodes have characteristics such that the resistance in the reverse flow direction is greater than that of the forward flow direction. In this study, we investigated experimentally the flow resistance of the nozzle type fluidic diodes and analyzed the resistance of each section of this pump system. We calculated the change of the flow rate per cycle based on their resistance and discussed the relation between the flow resistance of the fluidic diodes and the discharge characteristics of the pump.

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### Laminar Forced Convection Heat Transfer in Rectangular Ducts Rotating about an Axis Perpendicular to Duct Axis (1st Report, Numerical Analysis in Case of Square Ducts)

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Fully developed steady laminar flow of viscous incompressible fluid in straight square ducts rotating at a constant angular velocity about an axis perpendicular to its axis under thermal conditions of axially uniform wall heat flux and peripherally uniform wall temperature at any axial position is studied. Numerical

solutions were obtained for  $ReR_D$  numbers from 10 to  $10^5$  (for  $Re$  numbers from 1 to 4200). At low to moderate  $ReR_D$  numbers, a double-vortex secondary flow appears under the influence of the Coriolis force. For higher  $ReR_D$  numbers, it is found that an additional counter-rotating pair of vortices appeared and disappeared for the range of  $R_D$  numbers from 10 to 100. Correlation equations for friction factors and Nusselt numbers are obtained from numerical results. The numerical results in regard to the friction factor and Nusselt number are in good agreement with experimental and analytical results by other researchers for circular pipe.

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### The Study of Heat Transfer Performance for a Periodic Moving Condenser (For the Case of a Vertical Fluted Tube Condenser)

Katsuo NISHIYAMA The condensation of R11 vapor on vertical fluted tubes in three modes (heave, sway and roll) of sinusoidal vibration were studied experimentally in order to evaluate the effect of motion on the heat transfer performance for a moving ocean platform such as the OTEC plant. The cross-sectional shapes of the groove of the used tubes were the circular arc and triangle respectively. The effects of heave and sway motion on heat transfer performance were not detected at a vibrating force of up to 0.135g. But the roll motion enhanced the heat transfer performance as the amplitude or frequency became larger. This effect was recognized when the vibrating force became 0.11g or larger.

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### Precise Measurement of Thermophysical Properties of Solids by a Direct Electrical Heating

### Method (2nd Report, Technique and Theoretical Evaluation of Accuracy in the Case of Thin Ribbon Sample)

Ichiro TAKAHASHI, Akira SUGAWARA and Hidenobu MIFUNE

The purpose of this study is to demonstrate a viable method to measure the thermophysical properties of thin ribbon samples such as amorphous alloys, which cannot be adequately studied by conventional methods. In this paper, the techniques of measuring thermal conductivity and total hemispherical emittance by an improved steady state direct electrical heating method and theoretical evaluation of the accuracy in a thin ribbon sample are described. From the results of the experiments on JIS. SUS 304 ribbon samples with 20  $\mu$ m thickness, it becomes clear that the measurement of the above mentioned properties for a thin ribbon sample can be satisfactorily conducted by the use of this method.

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### Current Conducting and Arc Discharge Characteristics Through Coal Slag Layers Over Electrodes

Kazutomo OHTAKE, Tadashi KONISHI and Katsuhiko ARAYA

The current conducting and the arc discharge characteristics through coal slag layers over the electrodes are experimentally studied. The molten slags of Taiheiyo coal (original), 5% of  $Fe_2O_3$  added to the original in order to change the electron conductiveness, 5 and 10% of  $K_2SO_3$  added simulating the seed materials to be absorbed, are tested. The electrochemical reaction between slag and anode and the segregations of metals in the cathode slag layer, which have large ionization tendencies occur in rather short time from 10 to 30 seconds. These phenomena give the increase of resistivity at the anode, while the decrease at the cathode and the different behaviors to the arcs on the