

# 空気熱源ヒートポンプにおける着霜とシステム動特性

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# 1987 Fiscal Year Final Research Report Summary

## Frost Formation on An Air-Cooler and characteristics in Heat Pump System

Research Project

### Project/Area Number

61550154

### Research Category

Grant-in-Aid for General Scientific Research (C)

### Allocation Type

Single-year Grants

### Research Field

Thermal engineering

### Research Institution

KANAZAWA UNIVERSITY

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### Project Period (FY)

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### Keywords

HEAT PUMP / FINNED TUBE TYPE HEAT EXCHANGER / FROST FORMATION / システム動特性


### Research Abstract


Frost formation on a cold surface is an inherent feature for air coolers operating under low temperature circumstances, and is also a negative phenomenon from the standpoint of thermal efficiency. In order to develop high-performance heat pump system, the following fundamental problems should be studied: (1) the characteristic of heat exchanger operating with frost formation, (2) the characteristic of heat-pump system, in which a heat exchanger is included as a component element. In last year, analytical studies were performed mainly for the second problem by using a simple frost formation model. In this year, the first problem will be discussed experimentally and theoretically as a basic study to pursue the optimum design and operating conditions for heat exchangers.


Namely, the effect of frost deposition on heat and mass transfer for each row and pressure loss were investigated using a four rows finned tube type heat exchanger. The growth of a frost layer was found to depend on the location of the row because of the decrease in water vapor concentration toward the direction of air flow. The efficiency of heat transfer for each row and the pressure loss in the heat exchanger were predicted in relation with the growth of a frost layer for each row. By this prediction, it was found that the performance of heat exchanger operating in counter flow type was higher in comparison with that in parallel flow type, because of a denser structure and a uniform deposition of frost layer on the surface of the heat exchanger.


## Research Products (8 results)


All	Other
All	Publications (8 results)


[Publications] 青木ほか: 日本機械学会論文講演集. 87-935B. (1988) 


[Publications] 林勇二郎: 冷凍. 63-726. (1988) 


[Publications] 青木ほか: 第24回日本伝熱シンポジウム講演論文集. 537-539 (1987) 

[Publications] 林,滝本,多田: 日本伝熱研究会,北陸信越グループ講演会. (1988) 

[Publications] K.AOKI, et al.,: "The Difference in Characteristics between Parallel and Counter Flow Type Heat Exchangers with Frosting" Trans. of JSME,. 87-0935B. (1988) 

[Publications] Y. HAYASHI: "Frost Formation in Air Cooler" Refrigeration. 63-726. (1988) 

[Publications] K.AOKI, et al.,: "A Study of Extended Surface Heat Exchanger with Frosting (3rd Report, Analysis of the Performance on Heat Exchanger)" Proc. of 24th National Heat Transfer Symposium of Japan. 537-539 (1987) 

[Publications] Y.HAYASHI, A.TAKIMOTO, Y.TADA: "Frost Formation on An Air-Cooler and Characteristics in Heat Pump Systems Research Meeting of Heat Transfer Society of Japan," Hokuriku-Shinetsu Group. (1988) 

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