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EFFECT OF ASPECT RATIO ON IMPINGEMENT HEAT TRANSFER WITH TONE-EXCITATION

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Abstract

Previous studies of free and impingement jets related predominantly to those from circular nozzles. Recently, attention to three-dimensional non-circular jets has risen significantly, because of the peculiar phenomena such as "axis-switching" and theis potential to provide increased mixing rate relative to the circular jet.

In this report, the effect of aspect ratios (AR=1-8) on the heat transfer characteristics with and without the tone-excitation (its frequency is 50Hz(Const.)) impinged by an elliptic air jet has been studied experimentally at Re=5×10^4.

Planar effect on the pressure field and heat transfer characteristics is shown as the iso-Cp maps and iso-Nu maps in Figs.A-1 and A-2, respectively. It is shown that for a large aspect ratio, Cp and Nu on the target plate under the tone-excitation added from the minor axial direction have a small value and their profiles became flat, but those from the major axial direction do not vary such as those in the case of without tone-excitation. It is also shown that The location of "axis-switching" tends downstream with the increase of AR.

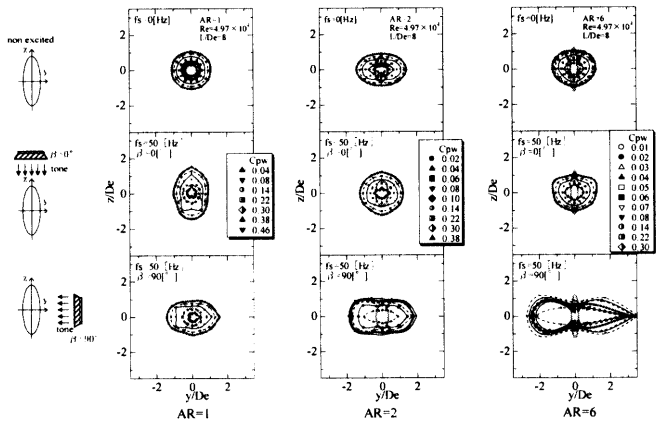

Fig.A-1. Iso-Cp_w profiles

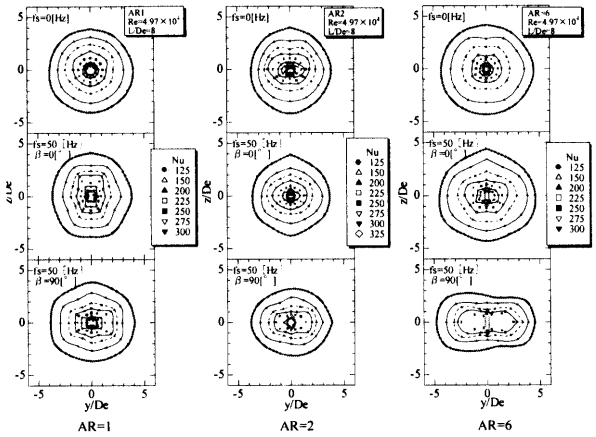

Fig.A-2. Iso-Nu maps