

FOURTH AUSTRALASIAN CONFERENCE
on
HYDRAULICS AND FLUID MECHANICS
at
Monash University, Melbourne, Australia
1971 November 29 to December 3

AN INVESTIGATION OF ANNULAR DIFFUSERS
FOR AXIAL FLOW FANS

by
N. Ruglen and M. C. Welsh

S U M M A R Y

This paper presents results of experimental investigations into the performance of annular exhaust diffusers with different centre body configurations, downstream of an axial flow fan. These results are discussed in light of the main findings of earlier related work.

When convergent centre bodies are used, the effectiveness decreases appreciably from a peak value of 91% to a value of 70% as the fan approaches stall. This result is related to the velocity distribution at the diffuser inlet, and in particular to deterioration of the boundary layer region near the centre body surface. This reduced diffuser performance is not significantly altered when boundary layer control in the form of vortex generators or swirl vanes is used on the centre body surface. Ring aerofoils, introduced for the purpose of producing a velocity and pressure perturbation on the centre body boundary layer, and truncation of the centre bodies to improve turbulent mixing were relatively ineffective in increasing performance.

For convergent-divergent centre bodies, diffuser performance is less sensitive to the velocity distribution at inlet. Higher values of diffuser static pressure recovery are achieved compared with the convergent centre body cases, at fan pressures greater than design.

N. Ruglen, CSIRO.
M.C. Welsh, CSIRO.