PERFORMANCE OF RADIAL FLOW VANELESS DIFFUSERS WITH DIVERGING WALLS

by

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Thesis submitted to the Indian Institute of Technology,Delhi
for the award of the Degree of
DOCTOR OF PHILOSOPHY

Department of Mechanical Engineering
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December, 1974

C E R T I F I C A T E

This is to certify that the thesis entitled "Performance of Radial Flow Vaneless Diffusers with Diverging Walls" being submitted by Mr. R.L. Gupta to the Indian Institute of Technology, Delhi, for the award of the Degree of Doctor of Philosophy in Mechanical Engineering, is a record of bonafide research work carried out by him. He has worked under my guidance and has fulfilled the requirements for the submission of this thesis, which has reached the requisite standard.

The results contained in this thesis have not been submitted in part or in full, to any other University or Institute for the award of any degree or diploma.

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A C K N O W L E D G E M E N T S

It is with great pleasure that the author records his deep sense of gratitude to Dr. S.M. Yahya who suggested the research problem and supervised the work reported in this thesis. Dr. Yahya's unceasing enthusiasm, fruitful discussions and constant encouragement inspired the author at all stages of this work.

Thanks are due to the staff of carpentary section, I.D.D.C. and Mechanical Workshop, in particular to Mr. Karam Singh, for their efforts in fabricating a number of components for the experimental rig. Thanks are also due to the staff of Steam and Turbomachinery Laboratory for their co-operation and help during the experimental work.

The support rendered by the Ministry of Education, Govt. of India, for the financial help under the scheme of Quality Improvement Programme is gratefully acknowledged.

The author thanks all his friends who have helped in one way or the other.

Finally the thanks are due to Mr. V.P. Sharma who typed the manuscript.

NOTATIONS

A	Area of cross-section at any section of the flow.
A_R	Area ratio $= \frac{A_3}{A_2}$.
b	Width of diffuser.
C	Fluid velocity.
C_r, C_θ, C_x	Velocity components in r-, θ-, and x directions.
C_{PR} =	$(p_3 - p_2) / \frac{1}{2}\rho \overline{C}_2^2$, pressure recovery coefficient.
ΔC_{PR}	Gain of pressure recovery over non-swirl flow.
D	Diameter of the pipe.
d	Diffuser diameter.
f	Friction coefficient.
g	Acceleration due to gravity.
L	Length of flow path of air.
N	Speed of wire gauze rotor.
p	Static pressure.
p_o	Stagnation pressure.
R	Gas constant.
R_e =	$\frac{C \times 2b_2}{\nu}$, Reynolds number based on hydraulic mean diameter (2b).
r	Radial distance.
T	Static temperature.
T_o	Stagnation temperature.

x		Axial distance measured across the width.
ν	=	$\frac{\mu}{\rho}$ kinematic viscosity.
θ		Angle of divergence of the diffuser walls.
α		Angle between absolute velocity and tangential component.
ρ		Density of air.
ξ	=	$(p_{o2} - p_{o3}) / \frac{1}{2}\rho\bar{C}_2^2$, loss coefficient.
λ	=	$\xi / 1 - \frac{1}{A_R^2}$, loss coefficient.
η_{d1}		Diffuser efficiency based on stagnation pressure loss.
η_{d2}		Diffuser efficiency based on the static pressure rise.

SUBSCRIPTS

1.	Entry to the test rig.
2.	Entry to the diffuser.
3.	Exit of the diffuser.
w	At the diffuser wall.

SUPERSCRIPTS

-	Average value.
′	Ideal value.

C O N T E N T S