ShrishamraoPatil (Yadravkar) Educational & Charitable Trust's

Sharad Institute of Technology

College of Engineering, Yadrav (Ichalkaranji)

Department of Mechanical Engineering

A

PROJECT REPORT

ON

"Experimental Investigation of Fluid Elastic Instability In Square Finned Tube Array Subjected To Air Cross Flow"

SUBMITTED BY

PRN No	StudentName
51631720181161280003	MR. RUTURAJ SUBHASH CHOUGULE
51631720181161280007	MR. VISHWAJEET BABGONDA PATIL
51631720181161280022	MR. MANTHAN SUNIL PATIL
51631720181161210100	MR. SANGRAM RAJGONDA PATIL

UNDER THE GUIDANCE OF

Mr. P. H. YADAV

ShriShamraoPatil (Yadravkar) Educational & Charitable Trust's

Sharad Institute of Technology, College of Engineering, Yadrav (Ichalkaranji)

Certificate

This is to certify that the project report entitled

"Experimental Investigation of Fluid Elastic Instability In Square Finned Tube Array Subjected To Air Cross Flow"

Is submittedby

StudentName:

MR. RUTURAJ SUBHASH CHOUGULE

MR. VISHWAJEET BABGONDA PATIL

MR. MANTHAN SUNIL PATIL

MR. SANGRAM RAJGONDA PATIL

In partial fulfilment of the Project for the Bachelor of Technology has been completed under our guidance. To the best of our knowledge & belief, the matter included in it, is their genuine work.

Date:

Place: Ichalkaranji

GUIDE	HOD	PRINCIPAL
Mr. P.H.YADAV	Dr. P. M. Bhagwat	Dr.S.A. Khot
SITCOE, YADRAV	SITCOE, YADRAV	SITCOE, YADRAV

Acknowledgement

With a sense of regard and gratitude to our project, we would like to thank our guide **Mr. P.H. Yadav** for his guidance, interest and constructive suggestion during the study course. This project would not have been possible without his support and help. Wethankhimforhisvaluable and immense knowledge and timely help, which made this, project a reality. We would also like to thank our H.O.D. **Dr. P. M. Bhagwat.**

We express our sincere gratitude to our Principal **Dr. S.A. Khot** and our college for providing us with a platform to excel in life.

We are very thankful to those who helped us directly & indirectly to carry out this Project.

DECLARATION

We undersigned hereby declare that the project entitled "EXPERIMENTAL INVESTIGATION OF FLUID ELASTIC INSTABILITY IN SQUARE FINNED TUBE ARRAY SUBJECTED TO AIR CROSS FLOW'' is original work prepared by us under the guidance of **Mr. P.H. Yadav.**

The empirical finding in this report is based on data collected by us. The matter presented in this report is not copied from any other source.

ThisworkishumblydedicatedtoDR.BABASAHEBAMBEDKARTECHNOLOGICAL UNIVERSITY during year 2020-2021 as under the subject of Final year project for the award of degree Bachelor ofTechnology.

Date:

Place: Ichalkaranji

Roll No	Student Name	Sign
51631720181161280003	MR. RUTURAJ SUBHASH CHOUGULE	
51631720181161280007	MR. VISHWAJEET BABGONDA PATIL	
5163172018116128022	MR. MANTHAN SUNIL PATIL	
51631720181161210100	MR. SANGRAM RAJGONDA PATIL	

INDEX

List of Figures

List of Table

Abstract

The effect of tube geometry like fin height and fin density on fluid elastic instability is examined experimentally using a normal square finned tube array with a P/D ratio 1.78. Flow-induced vibration is common cause of failure in shell and tube heat exchanger, and it may result substantial harm to the heat exchanger as well as significant financial loss. There are different mechanisms for flow induced vibration out of which fluid elastic instability and vortex shedding are the most sever due to their sudden occurrence and high amplitude vibration. Different parameters affect the tube vibration when the tube array subjected to air cross flow. In this experimentation the effect of fin height and fin density are examined for fluid elastic instability. Experimentation was performed to measure critical velocity at fluid elastic instability for plain and finned tubes for 3mm 3fpi (3mm fin height and 3mm fin density) 3mm 9fpi, 6mm 3fpi and 6mm 9fpi arrays. All this tube arrays with cantilever end condition and with a constant pitch ratio subjected to air cross flow was considered. Testing was done with gradually increasing air flow rate from $1m^3$/hr and increases up to $30m^3$/hr to obtain fluid elastic instability. The relationship between the critical velocity at fluid elastic instability and the mass damping parameter was investigated using Connor's equation. The amplitude response of vibration concerning the change in velocity shows that the addition fin height and fin density, affects the fluid elastic instability. A small peak before the occurrence of fluid elastic instability was observed. This may be due to vortex shedding which further required to be verified using the strouhal number.