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A STUDY ON APPLICATION OF FLUID MECHANICS IN PUMP MANUFACTURING

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ABSTRACT

Fluid Mechanics is the branch of applied Mathematics. Now a days it is the crucial part in day to day life. Use of Fluid Mechanics starts from drinking water to rocket science. one huge utilization is a fluid flows through the pipe, when a fluid flows through a the pipe. It experiences that fluid lost some energy due to resistance. This loss classified into two types major and minor loss. By using Darcy weishbach formula we can find the major head loss due to friction of a pipe.

KEYWORDS: ***Fluid Mechanics, Head loss, Darcy weishbach formula***

INTRODUCTION

Mechanics deals with motion and force producing motion. It classified into two types static and dynamic. Fluid Mechanics is study about gases and liquids at rest and in motion. It is the part of dynamic mechanics. When a fluid flows through the pipe under pressure. It loss some energy. This loss divided into two types (1) minor energy loss due to sudden expansion of pipe, contraction of pipe, bend of pipe or else due to pipe fitting ect… (2) Major energy loss is due to friction and it is calculated by Darcy weisbach formula and chezy's formula. By finding the head loss due to friction we can reduce the time of water flow and we can increase the amount of water which is flows in the pipe.

STATEMENT OF THE PROBLEM

To avoid the wastage of water by using Darcy weishbah and friction factor formula we can find the head loss due to friction. Then the wastage of water will be reduced and the time which was take to fill the water in the particular container will be reduced.

REVIEW TO LITERATURE

1. The authors Dr. B. Lavanya, M. Nagasasikala concluded this paper "Radiation Effects on mass transfer flow through A Highly porous Medium with Heat Generation and Soret Effect as "The influence of the free convection of the fluid"
2. The paper "Travelling waves solution of the unsteady Flow problem of collisional plasma bounded by the moving plate" finally concluded by the authors Taha Zakaraia Adbel Wahid menofia as A flow of the moving plate in unsteady flow.
3. Stability of pressure-driven flow in a deformable neo-hookean channel this paper concluded by the author as Flow in a rectangular channel.
4. "A Novel Algorithm for studying the effects of squeezing flow of a casson fluid between parallel plates on Magnetic Field" this paper is about the flow of Magneto Hydrodynamic squeezing flow.
5. The authors O.Anwar Beg Tasveer A.Beg and H.S.Takhar concluded this paper Mathematical and Numerical Modeling of Non Newtonian Thermo-Hydrodynamic Flow in Non Darcy porous Media as A flow of second order non Newtonian fluid.
6. V.V.Lunvev, P.S.Tikhonychev published this paper "Flow in a Narrow Chennel with Chemical Reaction on the wall" as A flow of non conduction biomagnetic mode.
7. "Mathematical modeling of Bio magnetic flow in a Micropolar Fluid Saturated Darcian Porous Medium" this paper is about the gas flow.
8. The authors Madasu Krishna Prasad, D.Srinivasacharya concluded this paper "Micropolar Fluid Flow Through a Sphere Embedded in a Porous Medium" as uniform flow in the cylinder and a Sphere.
9. "Suppression of purely-elastic instabilities in the torsional flow of viscoelastic fluid past a soft solid" paper discussed a about] Flow of viscoelastic fluid in past of soft solid.
10. The author Quan Zhang,Zhiming Wang published this paper "Modeling Study on Fluid Flow in Horizontal Perforated pipes with wall influx" as Flow of a fluid in horizontal Welbore

PROBLEMS

1. Calculate the head lost due to friction in a pipe which was fitted in **KAM PUMP.** The diameter of the pipe is 600mm. and the length of the pipe is 1.5km long. The velocity of flow of water is 2.5m/s. and the friction factor is 0.02.

Solution:

We know that,

HEAD LOST DUE TO FRICTION $h_f = \frac{F.l..V^2}{2.g.d}$

$= \frac{0.02*1500(2.5)^2}{2*9.81*0.6}$

$h_f = \frac{187.5}{11.77}$

$= 15.9276$

Since, head loss due to friction is 15.9276

2. Compare the diameter of flow of water in two pipes A and B. Pipe A was fitted in **the CHOTTU PUMP**motor of 3hp. Pipe B was fitted in the **CHOTTU PUMP** motor of 7.5hp. velocity of pipe A is 10m/s. and pipe B is 5 m/s. friction of both the pipe were same length (value of A_f=B_f)

Solution:

Let velocity of pipe A=V_1 and velocity of pipe B=V_2

$H_{f1} = \frac{F_1\ L_1\ V_1^2}{2.g.d_1^2}$

$H_{f2} = \frac{F_2\ L_2\ V_2^2}{2.g.d_2^2}$

$F_1 == F_2$, $L_1 = L_2$

$\frac{v_1^2}{d_1} = \frac{v_2^2}{d_2}$

$\frac{v_1^2}{v_2^2} = \frac{d_1}{d_2}$

$\frac{10^2}{5^2} = \frac{d_1}{d_2}$

$d_1=4\ d_2$

Diameter of pipe A is equal for 4 times Diameter of pipe B

3. The velocity of water in a pipe that fitted in the **DOMESTIC PUMP** of 200 mm diameter is 5m/sec the length of the pipe is 500m. find the loss of head due to friction if f=0.004 . find the friction and head lost due to friction?

Solution:

We know that,

F=4f

F=4*0.004

F=0.016

HEAD LOST DUE TO FRICTION $h_f=\frac{F.l..V^2}{2.g.d}$

$=\frac{0.016*500(5)^2}{2*9.81*2}$

=5.09968m

Head lost due to friction h_f=5.09968m

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