Experiment n°4

Head losses: experiment vs theories

# Objective

The main goal of this experiment is to confront the theories established with experiment performed on the bench in the Hydrodynamic Lab

# Description

The bench used is the HD98B hydraulic bench, precisely the pipes n°1, 2, 4, 5, 7, 8.

The n°1 pipe is a 77cm long pipe with a diameter of 16mm, the n°2 pipe is a 47.4mm diameter and 29.5 cm long pipe. The pipe n°4 is 3 section pipe, each section is 30 cm long the diameter of each section is 27.4mm, 20mm, 16mm. The number 5 pipe is a 20mm diameter and 77 cm long rough pipe, the ε is about 0.0015. The pipe n°8 is a 20mm diameter pipe.

# Theories

When a fluid flows in a pipe, friction due to the contact between the fluid and the pipe, appear.

Head losses follow the following laws:

Darcy-Weisbach formula: ξ regular head lose coefficient

For laminar flow:

For turbulent flow in a smooth pipe:

(Blasius fromula)

For turbulent flow in a rough pipe, the Colebrook formula have to be used:

(Colebrook formula)

# Material

U shaped manometer,

Pipes 1, 2, 4, 5, 7, 8

# Experiment

1. Check the opening of the exit valve;
2. connect the U shaped manometer to the desired pipe;
3. pick up the value of the manometer

Pick up the value of manometer in the following table:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Qv m3/s | U m/s | ξ measured | Re | (ξ Blasius/Poiseuille) | (ξ Colebrook) |

Compare the value measured to the theoretical ones, conclude.