# CE372 Lab Report #2

**Name:**

**Surname:**

**ID:**

**Date of Experiment: 16.11.2011-11:10**

# Introduction

In this experiment students have seen and observed diffrent aspects of hydromechanics such as friction and some minor losses, how the type of material affects the friction loss, some pump properties etc.

# Calculations

|  |  |
| --- | --- |
| Area of Tank | 0.2025 |
| Volume of Tank | 0.010125 |
| Area of Discharge | 0.00016 |
| P(wetted perimeter) | 0.164 |
| Dh=4\*A/P | 0.003902 |
| Km | 0.3 |
| C(iron) | 130 |
| L(iron) | 2.1 |
| D(iron) | 0.03 |
| L(plastic) | 2 |
| D(plastic) | 0.03 |
| D1 | 0.035 |
| D2 | 0.025 |
| C(plastic) | 150 |

|  |  |  |  |
| --- | --- | --- | --- |
| time | 53 | 41 | 32 |
| Q(volumetric) | 0.000191038 | 0.000246951 | 0.000316406 |
| h1 | 0.239 | 0.29 | 0.4 |
| h2 | 0.258 | 0.305 | 0.48 |
| Δh | 0.019 | 0.015 | 0.08 |
| Q(bent-meter) | 0.000257015 | 0.00022675 | 0.000550626 |
| %error | -34.536319 | 8.180169469 | -74.02511694 |
| ha | 0.181 | 0.181 | 0.181 |
| hb | 0.254 | 0.28 | 0.411 |
| h(difference) | 0.073 | 0.099 | 0.23 |
| V(ideal) | 1.196770655 | 1.393692936 | 2.124288116 |
| Q(ideal) | 0.000191483 | 0.000222991 | 0.000339886 |
| Cd | 0.997673067 | 1.107449914 | 0.930918479 |
| Re | 4670.324506 | 5438.801702 | 8289.904843 |
| hm(each elbow) | 0.0219 | 0.0297 | 0.069 |
| Hf(iron) | 0.1453473 | 0.192661917 | 0.420176317 |
| Hf(plastic) | 0.106229232 | 0.140809822 | 0.307092099 |
| hm(expansion) | 0.0672768 | 0.0912384 | 0.211968 |
| hm(contraction) | 0.017512703 | 0.023750104 | 0.05517701 |
| Total Head Loss | 0.402066034 | 0.537560243 | 1.201413426 |
| Pp(Pump Power) | 0.755261433 | 1.175934767 | 4.005851914 |

Km, C(iron), C(plastic) were all taken from the ‘CE372 HYDROMECHANICS LECTURE NOTES FALL 2009’

Q(volumetric) = V/ Δt

Δh=h2-h1

Q(bent-meter)=0.0021(Δh)^0.53

%error= [Q(volumetric) -Q(bent-meter)]/ Q(volumetric)\*100

h(difference)= hb-ha

V(ideal)= sqrt(2gh)

Q(ideal)= A\* V(ideal)

Cd= Q(volumetric)/ Q(ideal)

hm(each elbow) = Km\*V^2/(2\*9.81)

Hf = 6.8\*L\*V^1.85/(C^1.85\*D^1.165)

hm= ((D1/D2)^2-1)^2\*V2/(2g)

Total Head Loss: hm(contraction)+ hm(expansion)+ Hf(plastic)+ Hf(iron)+ hm(each elbow)\*3

Pp(Pump Power) = 9810\* Total Head Loss\*Q

# Discussion & Results

The experiment was carried out in a smooth way. Even though the error we obtained was absurd. This has many reasons to it. First of all the students who were reading the values might have read it wrong. A student who was looking at the water level from about might have stopped the time a little earlier which might affect the results. Other than that the equipment was really dirty the pipes had lots of dirt in it which affects the results a lot. There are many more things which can cause errors such as these ones.

In the second test we obtained Q(ideal)< Q(real). This cannot be true so one of the errors mentioned above was in action during this test.

All in all we found out that the pump power was about 4kWs and all the other results were as expected.