**EXPERIMENT NO. 4**

**CHARACTERISTICS OF A SUBMERGED JET**

**Instructions**

For submission of this experiment you have to submit one excel file and one pdf file. Use naming format ‘rollno\_expt 4’. Detailed instructions are given below.

**Excel sheet:**

* Perform calculations to fill the remaining columns as per equations mentioned in video and lab manual.
* Plot the following graphs in excel file- ‘U vs z/d’, ‘U/Uo vs 1/(z/d)’ , ‘U vs r2’ and U2 vs r2’.
* To find area under the curves use trapezoidal rule. You can look online for the procedure to do this. The following link may help <https://www.extendoffice.com/documents/excel/5898-excel-calculate-area-under-plotted-curve.html>
* The X, Y, XY and X2 columns of part 1 table for Sr. no 1 (i.e. z/d=0) can be left blank.
* Density of fluids are given in instruction sheet

**Pdf file:**

* The pdf will be hand written document where you have to show all the steps for calculation of at least one reading from each table (Part 1 and both 8d and 14d of part 2). (Read NOTE for which row you have assigned)
* You have to attach the screenshots of graphs and calculated table in the pdf which you have drawn in the excel sheet. (copy pasting will be okay).
* Find discharge and momentum at both 8d and 14d as per formula given in manual from area under ‘U vs r2’ and U2 vs r2’ graphs respectively.
* You have to write sources of error (**at least two)**.
* Write down your conclusion from the results.
* Answer the following questions-
  + What are the three zones in submerged jet flow? Explain briefly.
  + What is the half-angle for submerged jet?
  + Why is the calculated momentum at 8d not equal to that at 14d?
  + Why is the calculated discharge at 14d less than that at 8d?

**NOTE**: For hand written calculation following scheme is to be used

Step 1: Use last two digits of your roll number. X1- last digit, X2- second last digit

Step 2: For part 1, perform calculation of reading with Sr. no X1.

[Exceptions: 1) If X1=1; use Sr. no 11,

2) If X1=0; use Sr. no 10]

Step 3: For part 2, perform calculations for both distances 8d and 14d of reading with Sr. no X3 where X3=remainder of (10X2+X1)/5.

(Exceptions:

If remainder = 1 use Sr. no 6 (Since Sr no 1 is already obtained from part 1),

If remainder = 0 use Sr. no 5.

Otherwise take remainder as it is and perform calculation.)

**Example1**: For Roll number 184106031; X1=1 X2=3 henceX3= 1 so use Sr. No 11 for part 1 and Sr. number 6 for part 2.

**Example2**: For Roll number 184106040; X1=0 X2=4 hence X3= 0 so use Sr. No 10 for part 1 and Sr. number 5 for part 2.