

## **EXPERIMENT :- TO DETERMINE THE MANNINGS RUGOSITY COEFFICIENT OF A LABORATORY FLUME.**

Importance of the experiment :-

The Manning's (n) value is a unit less coefficient that represent the roughness or friction factor of the conduit. Rougher conduits with higher friction have a higher value, and smoother conduits with lower friction have a lower value.

The form of the Manning equation should make sense with the Manning n in the denominator (bottom) of the equation. With all other things being equal, a higher n value, representing a higher conduit friction, would result in a lower flow rate. This should make intuitive sense, as more friction would tend to slow the flow down.

Because the Manning equation is an empirical equation, the values for Manning n are derived from experiment and observation.

The Manning equation is very versatile and can be applied to many different applications in water resource systems.

### **Values of manning coefficient for some common materials**

Cast or Ductile iron, new	0.012
Clay tile	0.014
Concrete - steel forms	0.011
Concrete (Cement) - finished	0.012
Concrete - wooden forms	0.015
Concrete - centrifugally spun	0.013
Copper	0.011
Corrugated metal	0.022
Earth, smooth	0.018

MANNINGS EQUATION:-

$V = \frac{1}{n} R^{2/3} S^{1/2}$ , where  $v$  = velocity of flow (m/s),  $R$  = hydraulic mean radius =  $(A/P)$ ,  $S$  is the slope of the channel bed and  $(n)$  the manning coefficient.

Also,

$Q = \frac{1}{n} A \cdot R^{2/3} S^{1/2}$  where  $A$  is the cross sectional area of flow ( $m^2$ )

Procedure :-

- (1) switch on the apparatus
- (2) Wait to stabilize the water in the flume
- (3) Set the slope of the flume
- (4) Note the discharge reading .
- (5) Measure the depth at three/four different location for one discharge reading .
- (6) Take the average of three depths
- (7) Then change the discharge and measure the depth readings again



Rectangular Channel(flume) in the fluid mechanics Lab.

## OBSERVATIONS AND CALCULATIONS

For a channel **width of 300 mm**, **complete the table given below**

S.No	Bed Slope	Flow rate M <sup>3</sup> / Sec	Mean depth (mm)	Area of flow M <sup>2</sup>	Wetted perimeter M	Hydraulic Radius M	Flow Velocity m/sec	Mannings coefficient
1	0.0020	0.007998	42.93					
2	0.0020	0.009795	50.00					
3	0.0020	0.011311	54.30					
4	0.0020	0.012646	56.73					
5	0.0020	0.013853	63.33					
6	0.0020	0.015996	64.57					

NOTE:- Open the link to see the video

<https://www.youtube.com/watch?v=ismUNQnuSRE&feature=youtu.be>