Name:Rishav Kumar
Roll No: B19ME066

Experiment-11

Pressure Change Caused by Rotation

Aim:To study the variation of pressure from the centre of a rotating fluid rotated in a beaker.

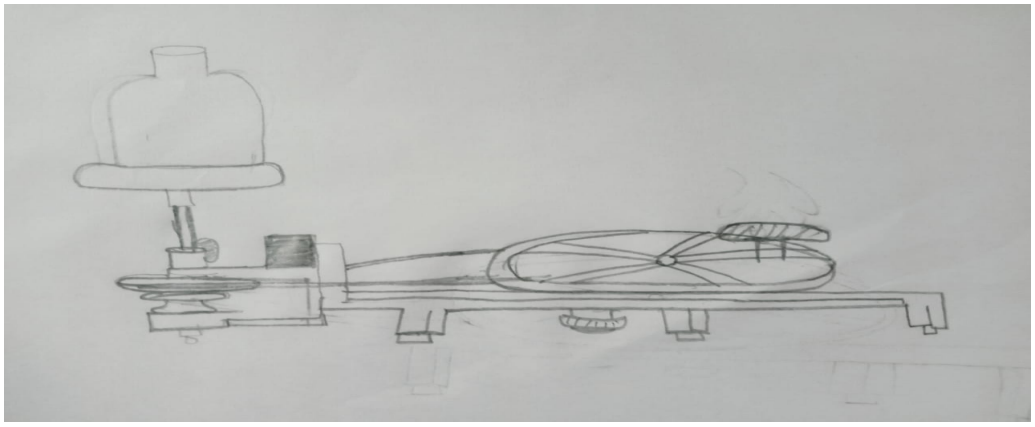
Equipment Required:

- Glass Beaker having small opening at top like bottle.
- Two wheels having different radius (approx 15cm and 5cm radius).
- One chain or rubber band connecting both the wheels.
- One handle connected at bigger wheel to rotate it.
- One small stand attached to small wheel.
- Measuring scale.
- Camera.
- Stopwatch.
- A pressure measuring device.

Calibration of Equipment:

Connecting both the wheels of different radius with chain or rubber band so that if bigger wheel rotates smaller wheel also rotates.Connecting handle to the bigger wheel to rotate it.Connecting a small stand to the smaller wheel and attach the beaker on the stand so that it rotates with same angular velocity as small wheel.

Schematic Diagram



<u>Experimental Procedure</u>:

- Pour some amount of water in the beaker.
- Rotate the bigger wheel and calculating number of revolution and time.From that we can calculate angular velocity(ϢϽ1) of bigger wheel.
- During rotation of bigger wheel we can calculate pressure of water at different distance from center of flask.
- Also we take images of shape of fluid.
- We will repeat this process with different angular velocity.
- Also we will repeat this process with 2-3 fluid having different density.

Calculation:

We have ϢϽ1 in rpm to convert it to rad/sec we have to multiply it with Π/30.

Angular velocity of smaller wheel(ϢϽ)= (ϢϽ1 x r1)/r2

(Here, r1 is radius of larger wheel and r2 is radius of smaller wheel.)

Theoretical pressure at a distance X from the center of the beaker= (ρ x ϢϽ x X^2)/2

Observation Table:

X	Theoretical pressure	Actual pressure

We will create 3 tables for 3 different fluid having different density.

Also we will take observation on different value of omega.

Plot : Actual pressure (y-axis) v/s (value of x) (At constant density)

Plot: Theoretical pressure (y-axis) v/s (value of x) (At constant density)

Plot: pressure v/s Density

And much more observation is possible.
Also we will take photo of shape of water at each omega.

Result:

We will observe that as we move away from center of beaker pressure increase and it will increase quadratically.
Also on increasing value of density pressure will increase linearly at a fixed point.
From the above observation table we can verify our above equation for pressure change due to rotation.
We will also observe shape of fluid at different parameter.

Chances of ERROR:

There are many chances of error like during calculating angular velocity of bigger wheel,taking reading etc.