Lab report; Fluid Visualization

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Abstract

Visualization of fluid flow is one of the most crucial experiments to understand the general patterns f fluid flow when it collides with several other objectives. We use the scientific model to predict mechanical data of fluid flow, such as force and velocity. Drag force is one of the experience forces. The drag force is the summation of friction drag and pressure drag where the direction of these forces is parallel to the flow. In a lift, force helps find an optimal amount of lift force related to Bernoulli's principle.

Introduction

For an open channel, the passage of the fluids leaves the upper part more exposed while the velocity distribution is straight. The velocity reduces while approaching the sides and bases of the fluids due to more friction. The velocity of the flow is maximum at the topmost point where the vertical centerline is but due to the effect of surface tension and friction resistance from the air. The velocity is reduced at the free fluid surface. the vertical velocity is the velocity measured along a vertical line on the channel cross-section

The Reynold number is the ratio of the inertial forces to the viscous forces acting in any flow phenomena. It helps predict if the flow is laminar or turbulent and find the friction coefficient to determine the frictional loss of head accurately. The Reynold number has much application. It provides engineers with convenient information about the state of flow, helping to solve the problem at hand. It is also used in dimension analysis and similitude.

For lamina flow, the liquid moves in layers, which occurs when the velocity of the flow is small and viscous forces are predominant. for the case of streamline flow velocity at a point that is

constant in magnitude and direction and turbulent flow, the velocity reaches a maximum in a specific point on the fluid, meaning the magnitude of the velocity varies with time

On the concept of the body layers, when a specific fluid passes past a solid. the fluid particles on the surface will have the velocity of the surface because of the viscosity of the fluid .

Figure 1 streamline

Figure 2 Turbulent flow

Objectives

To illustrate turbulent flow and determine under which circumstance regimes occur

To study the fluid flow by observing several trends lines of each flow and compare them

To qualitatively analyst and compare the fluid flow of different objects and find the optimal shape of the objective for fluid flow

Experiment and discussion

In this technique, the flow is turbulent. The fluid was put in a cylindrical container, and the material emerged on that fluid. The method of visualization of flow behavior will be performed by slowly and steadily injecting the fluid through a medium; the state of flow will be visually determined and compared with the results from the calculation of the Reynold number.

The material contained a circular shape in a liquid container of a circular shape. After immersing, there is relative motion between the body and the fluid exerts a force on the body, and the body exerts an opposite but equal force back; this immersed body experiences two forces that is the drag force and the lift force. The drag force is the force in the direction of the flow of the emerged material and the lift force, which is perpendicular to the flow. The components are due to the pressure drag, while the components due to shear stress are the shear drag.

The contribution of the pressure drags and the friction drag to the total drag depends on the shape of the body for our case in the cylinder body and because this is ideal fluid is a symmetrical distribution around the body is symmetrical making the resultant forces acting on the sharp corner near to be zero. Art, the sharp corners of the object, extends across full projected width. the boundary layer can be viewed around the boundary object

Conclusion

The boundary layer is visible, and the flow is turbulent around the object. In the separation point, the boundary is retarded due to an adverse pressure gradient. The emerged body experiences both drag and lift forces. The liquid flows n the upper point of the material undisturbed due to gravity.

References

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