

## Types of Fluid Flow

Fluid flow is generally broken down into two different types of flows, laminar flow and turbulent flow. Laminar flow is fluid motion in which all the particles in the fluid are moving in a straight line. For example, the thin layer of fluid in contact with the wall of a pipe travels very slowly due to the friction at the wall. Moving toward the center of the pipe, the fluid travels in layers of increasing speed, reaching the maximum speed at the center of the pipe. These layers slide past one another with little interaction. When the speed of the fluid in relation to the pipe reaches and passes a critical speed, the fluid motion becomes turbulent. Turbulent flow is an irregular flow of particles; characterized by whirlpool-like regions. Unlike the straight line motion of laminar flow, the particles of turbulent flow are in a state of chaos, some actually with opposite velocity vectors to each other. Both types of flow occur inside an object or outside an object, for example, fluid flow inside a pipe or fluid flow around a baseball.



A.)

B.)

[http://members.tripod.com/~del\\_jones/fl\\_tn.htm](http://members.tripod.com/~del_jones/fl_tn.htm)

A.) Laminar Flow(no eddies)

B.) Turbulent Flow

A basic understanding of laminar flow will help the understanding of turbulent flow. A laminar flow is one in which all the particles of a fluid within a layer are moving at the same rate. Another way to think of this is by visualizing cars moving smoothly along a multi-lane road; everything is orderly, under control, with the fast cars in the left lane and slow cars in the right lane. In fluid flow, the fluid in contact with an objects surface will slow, however the particles within a layer will all still be traveling close to a consistent velocity. When the critical speed of a fluid is reached the fluid becomes turbulent. The point at which a fluid becomes turbulent is based on a unit less parameter called the Reynolds number.



<http://www-personal.engin.umich.edu/~dkyser/weather/pics.htm>

[Source: [http://ffden-2.phys.uaf.edu/212\\_fall2003.web.dir/robert\\_casey/typeoffluid.htm](http://ffden-2.phys.uaf.edu/212_fall2003.web.dir/robert_casey/typeoffluid.htm)]

## Types of Fluid Flow in Pipes: Laminar, Turbulent, Transient

Pipes are circular in cross section area, identical to the shape of a roll of paper towels. We generally use pipes in our homes to supply water from water tank to kitchen, bathroom, etc.

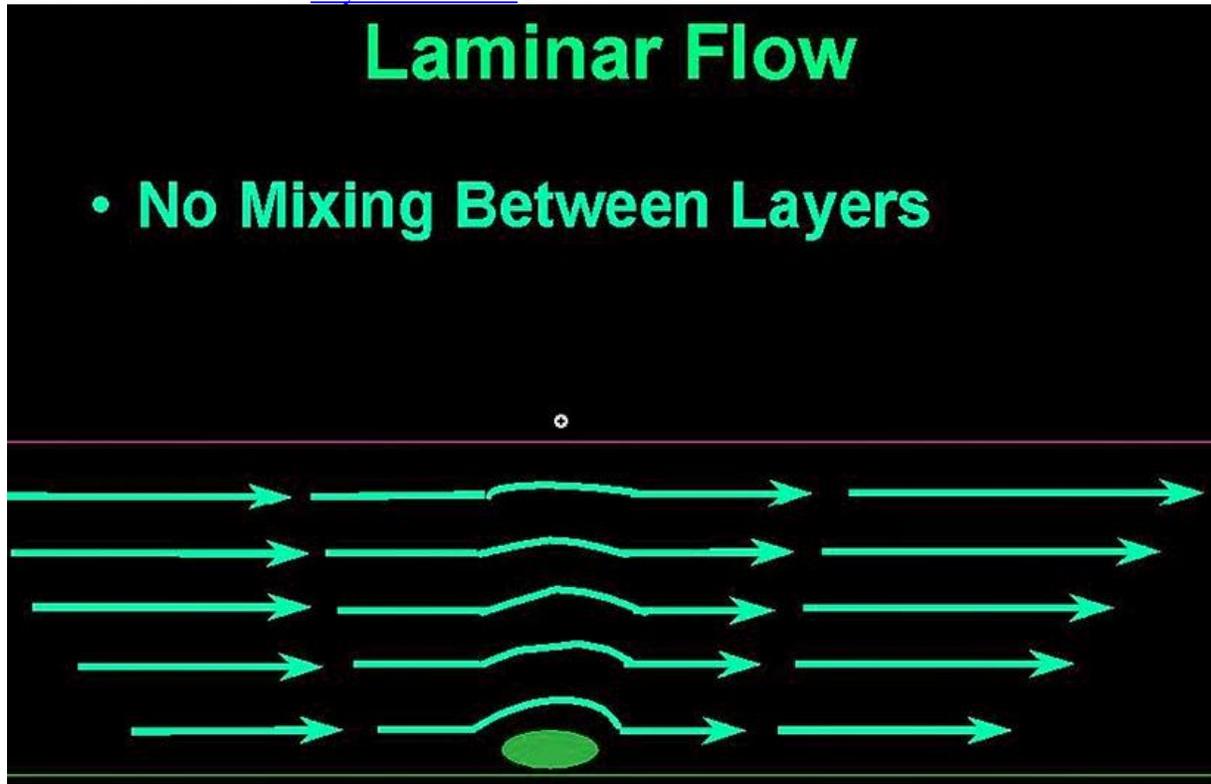
Three different types of fluid flow are written in brief under

1. [Laminar flow](#)
2. [Turbulent flow](#)
3. [Transitional flow](#)

### 1. Laminar flow:

Occurs when the fluid flows in parallel layers, with no mixing between the layers. Where the center part of the pipe flow the fastest and the cylinder touching the pipe isn't moving at all.

The flow is laminar when [Reynolds number](#) is less than 2300.



Laminar flow in pipes

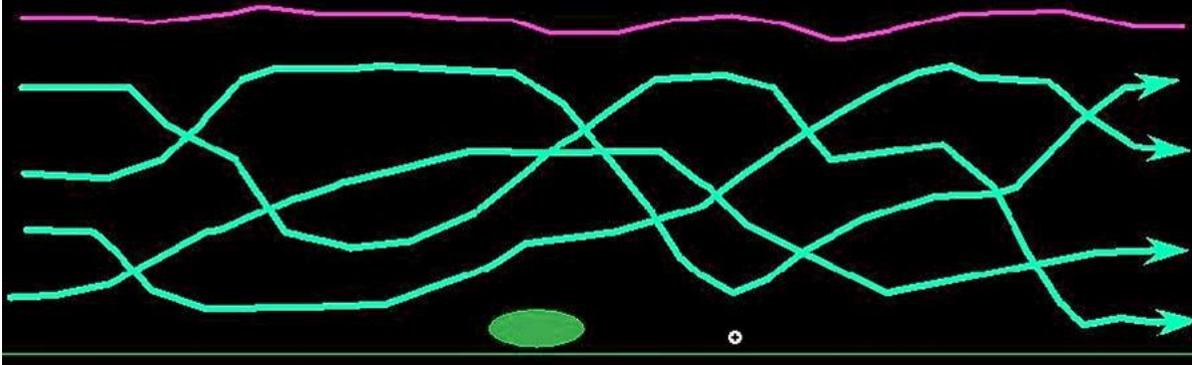
## 2. Turbulent flow:

In turbulent flow occurs when the liquid is moving fast with mixing between layers. The speed of the fluid at a point is continuously undergoing changes in both magnitude and direction.

The flow is turbulent when [Reynolds number](#) greater than 4000.

# Turbulent Flow

- **Mixing Between Layers**



Turbulent flow

### 3. Transitional flow:

Transitional flow is a mixture of laminar and turbulent flow, with turbulence flow in the center of the pipe and laminar flow near the edges of the pipe. Each of these flows behaves in different manners in terms of their frictional energy loss while flowing and have different equations that predict their behavior.

The flow is transitional when [Reynolds number](#) is in between 2300 and 4000

[Source: <https://me-mechanicalengineering.com/types-of-fluid-flow-in-pipes/>]

Further Learning:

<https://www.youtube.com/watch?v=0VEDeLU2JJs>