

Hydrodynamics

Bernoulli's Principle

- **Concept:** Bernoulli's Principle states that the pressure of a fluid decreases as its velocity increases and vice versa. This principle is derived from the conservation of energy in fluid dynamics, where the total energy in a fluid system remains constant.
- **Applications:**
 1. **Aviation and Aerodynamics:** Understanding the lift on airplane wings.
 2. **Venturi Effect:** Used in carburetors and injectors to mix fuel and air by restricting flow, increasing speed, and reducing pressure.
 3. **Flow Measurement:** Utilized in Pitot tubes and Venturi meters to measure fluid velocity and flow.
 4. **Blood Flow:** Helps in understanding blood pressure and flow in medical applications.
 5. **Water and Air Purification:** Used in designs to create low-pressure areas for filtration.
 6. **Sprayers and Nozzles:** Employed in devices to convert liquids into fine sprays by reducing pressure and increasing velocity.(hydrodynamics)

Hydrodynamic Levitation

- **Concept:** Hydrodynamic levitation involves the suspension of objects in a fluid medium using fluid pressure forces. By manipulating fluid flow patterns and pressure gradients, an upward force is created to counteract gravity, resulting in levitation.
- **Applications:**
 1. **Material Processing:** Used for precision heating, cooling, and shaping of materials.

2. **Semiconductor Manufacturing:** Enables contactless and contamination-free handling of delicate components.
 3. **Biomedical Engineering:** Facilitates non-invasive manipulation of cells or microorganisms.
- **Experimental Methods:** Experiments are conducted to observe and analyze levitation phenomena, providing insights into the behavior of levitating objects and the effects of fluid properties.
(hydrodynamics)

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