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The Law of Buoyancy Force

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***Abstract*—In hydrostatics, Floating body pushed down by external force, its submerged move down in a fluid. After its came to reach on fluid, it will at partially or fully float on fluid. Here, we show that body was came high force to reached on fluid. It was depends on specific gravity of body. We show that the buoyancy force was relationship between with specific gravity of body; we study the buoyancy force after we can say the law of buoyancy force.**

Keywords—Buoyancy Force, Buoyancy, Specific Gravity Of Body, Floating Bodies.

1. INTRODUCTION

An object does has float on fluid; why? This floating is caused by the buoyancy force [1, 2, 3]. The buoyancy force is upward push to it. Then, it's keep float on fluid. Why is buoyancy force push to it on fluid? Because of the buoyancy force are depends on the density of body and density of fluid. With clarification that ice can float on water. Because, of the density of ice is smaller than density of water. For reason of, an object whose density is greater than that of the fluid. Which it's submerged tends to sink. An object is either less dense than of fluid. The buoyancy force can keep the object a float [4, 5].

We trying the pushing down on a floating body in fluid or water, and we feel the buoyancy force was pushed upwards on fluid. The buoyancy force is vertically upwards to partially or fully submerged body on fluid at rest. The rest of body on fluid as called the buoyancy of body. According to Archimedes' law [6, 7, 8, 9, 10], 'the Mass of liquid displaced by an object is equal to the mass of that object'. Buoyancy force was pushed the bodies on fluid, that's bodies will floating on fluid. The floating body was depends on density of body [13, 14] and density of fluid [11, 12]. An object whose density is greater than that of the fluid, which it's submerged, tends to sink. An object is either less dense than of fluid. The buoyancy force can keep the object a float. The floating body was before sinking in fluid. Or floating body pushed down by external force, its submerged move down in a fluid. After its came to reach on fluid, it will at partially or fully float on fluid. Here, we show that body was came high force to reached on fluid. It was depends on specific gravity of body. Specific gravity of body was less, body was came the high force to reached on fluid. Otherwise, specific gravity of body was more; body was slow force to reach on fluid. But specific gravity of body was more than one; defiantly it's tending to sink in fluid. We conduct the practical experiments to we found the law of buoyancy force.

2. PRACTICAL EXPERIMENT OF BUOYANCY FORCE

2.1 Considered the same mass of two different specific gravity of body.

We have developed a simple, low cost experiment to investigate the buoyancy force relationship between with specific gravity of body. We considered the same mass with different specific gravity of bodies to using conduct experiment on aquarium. Our experiments allows for checking whether buoyancy force was upward pushed the bodies an high or low force on fluid as depends on specific gravity of body. We have taken same mass with two different specific gravity of body, one body is A made of specific gravity 0.91(hence a density of A 0.91 grams/cm^3, mass of A 200grams, volume of A 219.8 cm^3, density of water is 1grams/cm^3), another one B body was made specific gravity of 0.7 (hence a density of B is 0.7grams/cm^3, mass of B is 200grams, volume of B is 285.7 cm^3). Now , we come to conducting an experiment as taken two body as A and B, we slightly press down as depth 1m below in aquarium by used the our hand finger or external instruments. Two body has reached the below 1m depth in water, then we slowly removed our hand finger or external instruments, now we seeing the two body in aquarium, Immediately buoyancy force is pushed the upwards direction to two body on water. B body is upward the moved the high force to reached on water as compared the A body. But, A body is slowly upward direction to reach on water. It's taken more time to later reach on water as compared the B body. In conduct experiment, we have observed the two bodies, may we know that buoyancy force was high force to push the B body, because the specific gravity of B was less or decreased than specific gravity of A body. Buoyancy force was slow force to pushed the A body in water, because of specific gravity of A was more or increased. In this simple experiment conduct make we understand the "buoyancy force is always reciprocal to specific gravity of body".

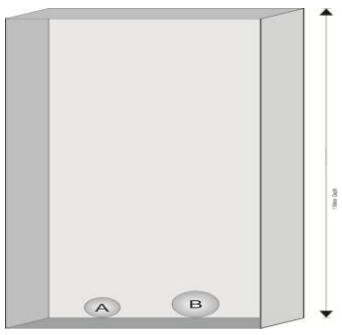

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Figure 1. We slightly press down the by using our hands finger or external instruments as below 1m depth. Two bodies are reached below 1m depth in aquarium, two bodies is rest in below surface.

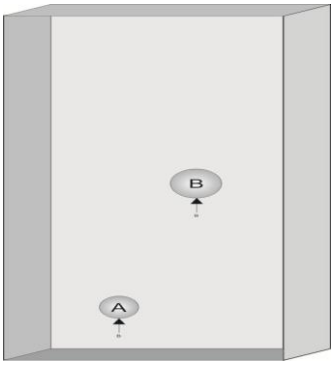

Figure 2. Buoyancy force is pushed the upwards direction to two body in water. We seeing that B body is upward the moved the high force to reached on water as compared the A body. But, A body is slowly upward direction to reach on water. It's taken more time to later reach on water as compared the B body. We know that B body was high force with high velocity to move in water. A body was slow force with low velocity to move in water.

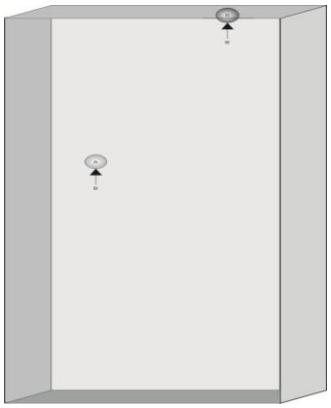

Figure 3. B body was high velocity to reach on water; it will tend to submerged in partially floating on water. A body was slow velocity to move in water. A body is slowly upward direction to reach on water. It's taken more time to later reach on water as compared the B body.

2.2.1 Considered the different mass with same specific gravity of body.

We have conducted another one simple experiment as considered the two different mass with similarly same specific gravity of two bodies. We take the made mass of the A body is 200 grams (hence a density of A body is a 0.9grams/cm^3, volume of A body 222.2 cm^3, specific gravity of A body is 0.9). Another one made mass of B body is 500 grams (hence a density of B body is 0.9grams/cm^3, volume of B body is 555.56 cm^3, specific gravity of A body is 0.9). Now, we come to conducting similarly experiment has taken the two body in aquarium, we slightly press down the by using our hands finger or external instruments as below 1m-depth. Two bodies are reached below 1m depth in aquarium. Then, we slowly removed our hands finger or external instruments. Immediately buoyancy force is pushed the upwards direction to two body on water. Two bodies is move up as same direction with same time at same conditions to reach on water. Now, we are observed the two bodies were moving up same force with same time to reach on water in aquarium. Because of the specific gravity of two body was same that's buoyancy force was pushed up the same force with same time, two bodies submerged to tending move up on water. But buoyancy force doesn't depend on mass of body. May we know the specific gravity of body was same that's its push up as same force with taking same time reach on water, then body will partially or totally float on water. We know that buoyancy force was relationship between with specific gravity of body. That's buoyancy force is increased, but specific gravity of body is decreased or less. Otherwise, buoyancy force is decreased, but specific gravity of body is more or increased in fluid. But mass of body and acceleration due to gravity is always remains constant. But it doesn't change that's due to buoyancy force push up body.

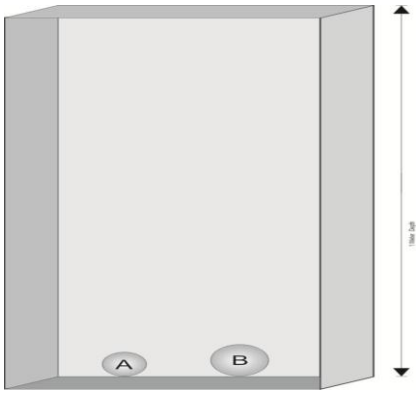

Figure 4. We slightly press down the by using our hands finger or external instruments as below 1m depth. Two bodies are reached below 1m depth in aquarium, two bodies is rest in below surface.

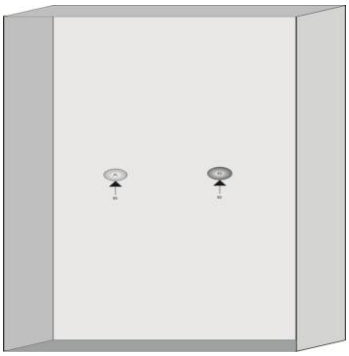

Figure 5. Immediately, buoyancy force is pushed the upwards direction to two body in water. Now, we are observed the two bodies were moving up same force with same time to on water in aquarium.

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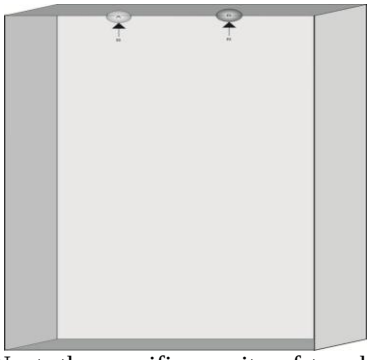

Figure 6. Next, the specific gravity of two body was same that's buoyancy force was pushed up the same force with same time, two bodies submerged to tending move up on water. Two bodies are partially floating on water in an aquarium surface.

3. LAW OF BUOYANCY FORCE

We has conducted the simple experiments to make understand and developed the law of buoyancy force. We can say be that law of buoyancy force as "A buoyancy force is always reciprocal to specific gravity of body in fluid, but mass of body and acceleration due to gravity is always remains constant".

We can say the law of buoyancy force as" buoyancy force is always reciprocal to specific gravity of body". we take into account of buoyancy force will varying in fluid that's depend on the specific gravity of body, we has study of conduct the experiment to make as equations is given by

$$Bf \alpha (1 \div S) \qquad (1)$$

Whereas Bf is buoyancy force, S is a specific gravity of body, the buoyancy force was up pushed to body in a upward direction, body can move up in some below depth in fluid surface into above on fluid surface, may we know that mass of body is always remains constant, and acceleration due to gravity was same with remains constant in fluid, we can considered the mass of body and acceleration due to gravity is always remains constant, we can write equations as below as..

$$Bf \alpha (m \times g) \div S \qquad (2)$$

Whereas m is a mass of body, g is acceleration due to gravity as 9.81m/sec^{2,} We know that specific gravity of body is defined as ratio of density of body at given temperature (ρb) and density of fluid at same temperature (ρf). Now considered specific gravity value into account with added in it. May we know the Hence a mass of body is equal to density of body into volume of body, We will add in this equation, we can write an equation as follow as…,

$$Bf \alpha (\rho b \times v \times g) \div (\rho b / \rho f)$$

$$\text{Or} \quad Bf \alpha (\rho f \times v \times g)$$

$$\text{Or} \quad Bf = (\rho f \times v \times g) \qquad (3)$$

We found an equation for Buoyancy force is equal to multiple amount of density of fluid, volume of body and acceleration due to gravity. This equation or formula is using to find the buoyancy force act on body in a fluid.

4. DIFFERENCE BETWEEN ARCHIMEDES' PRINCIPLE FOR BUOYANCY AND LAW OF BUOYANCY OF FORCE

Law of buoyancy force state that as "buoyancy force is reciprocal to specific gravity of body, but mass of body and acceleration due to gravity is always remains constant". Buoyancy force is up pushed on upward direction of body in fluid. Its high or low force reached on fluid. It does depend on specific gravity of body. We see that body is move up direction in water. It's given the relationship between with buoyancy force and specific gravity of body. According to Archimedes' law, "the Mass of liquid displaced by an object is equal to the mass of that object". When a body was rest on a fluid, it was partially or totally floating on a fluid that's we known as buoyancy of body. This force is directed upward and has a magnitude equal to the mass of the fluid displaced by the body.

5. CONCLUSION.

We conduct the practical experiment to investigate the found the law of buoyancy force, our experiments allows for checking whether buoyancy force was upward pushed the bodies a high or low force on fluid as depends on specific gravity of body. In experiment in a fluid, Specific gravity of body was less, body was came the high force to reached on fluid. Otherwise, specific gravity of body was more; body was slow force to reach on fluid. But, specific gravity of body was more than one; defiantly it's tending to sink in a fluid.

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