

Study and Analysis of Solar Boat

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Abstract - The sun light and convert it into usable electricity. We are going to have a detailed look at the theory behind the basic principle used in solar panels. Photons are the basic fundamental unit of any form of light energy. The photons that are emitted by the sun (visible light) are captured by the solar panels. The generation of electricity in the solar panels is possible because of a principle called as photovoltaic effect.

Keywords – Solar Boat

1. Introduction of Solar Boat

Solar boats are electrical boats, with independent quiet and clean engines, whose batteries store free energy from the sun. On the seas and inland waters as well as along their banks there are only a few connections to public electricity mains. People who live on inland waterway crafts, sailing boats, space stations and houseboats, are dependent on batteries, just as the owners of electrically propelled boats. But batteries sometimes discharge and must be replenished. One of the most elegant solutions for this is solar electricity. Solar electricity plants are reliable and durable. There are ever more areas of application for solar electricity, due to lowering prices and improving technologies.

2. Principle & Working

2.1 Archimedes' Principle

When a rigid object is submerged in a fluid (completely or partially), there exists an upward force on the object that is equal to the weight of the fluid that is displaced by the object.

$$F_B = \rho_{fluid} \cdot V_{submerged} \cdot g$$

Explanation:- When the object is removed, the volume that the object occupied will fill with fluid. This volume of fluid must be supported by the pressure of the surrounding liquid since a fluid can not support itself. When no object is present, the net upward force on this volume of fluid must equal to its weight, i.e. the weight of the fluid displaced. When the object is present, this same upward force will act on the object.

The net force on the object is given by,

$$F_{net,obj} = F_B - W_{obj} \\ = \rho_f V_{sub} g - \rho_{obj} V_{obj} g$$

When the density of the object is less than that of the fluid, the net force will be upwards and the object will rise.

A Helium filled balloon is a good example

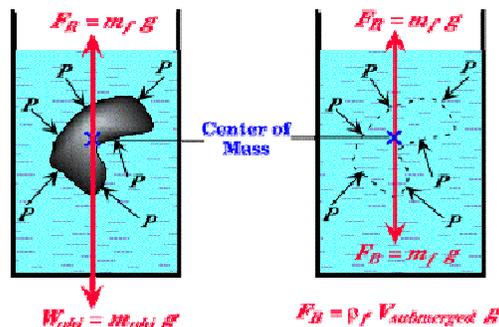


Fig. 1

Met centric Height:-

(shipbuilding) the point of intersection between two vertical lines, one line through the center of buoyancy of the hull of a ship in equilibrium and the other line through the center of buoyancy of the hull when the ship is inclined to one side; the distance of this intersection above the center of gravity is an indication of the stability of the ship.

Ship Propulsion:-

A ship moves through the water through propelling devices, such as paddle wheels or propellers. These devices impart velocity to a column of water and move it in the opposite direction in which it is desired to move the ship. A force, called reactive force because it reacts to the force of the column of water, is developed against the velocity-imparting device. This force, also called thrust, is transmitted to the ship and causes the ship to move through the water.

Photovoltaic Effect: -

Photons are the basic fundamental unit of any form of light energy. The photons that are emitted by the sun

(visible light) are captured by the solar panels. The generation of electricity in the solar panels is possible because of a principle called as photovoltaic effect.

3. Calculate The Power of Solar Panel & Power Consumed By Motor

Thrust force measurement :-

$$\begin{aligned} T_f &= 30\text{gm} \\ &= (30/1000) \times 9.81 \\ &= 0.2943 \text{ N} \end{aligned}$$



Fig.2

Power generated by solar panel

$$\begin{aligned} P_s &= V_s \times I_s \\ &= 4.5 \times 250/1000 \\ &= 1.125 \text{ W} \end{aligned}$$

Power consumed by motor

$$\begin{aligned} P_m &= V_m \times I_m \\ &= 3.2 \times 155 \\ &= 0.496 \text{ W} \end{aligned}$$

Abbreviation :-
 P_s :- Power of solar panel
 V_s :- Potential difference in solar panel
 I_s :- Current flow in solar panel
 P_m :- Power consumed by motor
 V_m :- Potential difference in motor
 I_m :- Current flow in motor

4. Advantage of Solar Boat

1. Renewable source is used
2. No pollution in environment
3. Cost of solar boat is cheap as compare to diesel boat.
4. Rigid panels provide more power than flexible solar panels.
5. Permanent mounting. There's only limited area on the deck to permanently.

extra layer of plastic protection to the panels will reduce their already low efficiency.

3. If the panels will be exposed to salt water, stainless steel frames and connectors need to be used to avoid premature rusting.

5. Draw Back Of Solar Boat

1. Problem in rainy & winter session due to lack of solar energy.
2. Connectors must be waterproof since the panels will be exposed to waves and rain. Adding an

6. Conclusion

1. It is cheaply as compare to diesel boat.
2. Renewable resource is used.
3. No environment pollution.

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