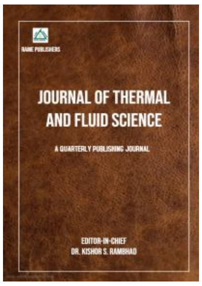

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A Study on the Evaluation of Low-Cost Floating House

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Abstract— **The paper presents a layout of a relatively inexpensive floating house requisite for people relying in coastal areas. The floating house would have the maximum capacity of family members' loads with qualified freeboard of 30 percent along with the body of the accompanying airtight empty steel drums in water with a planned floor space. The meta-centric height of the planned house is thought to have a positive meaning. Expenses of extracted data materials such as carpeting, walls, new roof, and floats are recommended to determine a most cost-effective and long-lasting solution.**

Keywords— Low-cost floating house; Meta-centric height; Moment of inertia

I. Introduction

The floating house is a unique structure that allows people to live on a safe base beyond risk of drowning and to stay alive while the water level rises and falls [1, 2]. It is not classified as a house cruise, but it is a floating house [2, 3]. The concept of floating house was developed to minimize damages due to floods in low lying areas such as coastal areas and/or valleys. Community boats are prohibitively costly for most rural residents [3, 4]. In light of the above, an effort is intended to support a low-cost floating house that is both safe and long-lasting [4, 5]. This amphibious floating structure is designed to use as a flood shelter [5-7]. The design of the floating house is made by using easily available materials.

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II. Proposed Methodology

For a middle-class family residing in rural areas, a floating house architecture based on local materials is suggested. The family consists of five individuals such as parents and, their three children in design [1, 2]. This structure was designed so that one can meet their natural need during a flood.

Fig.1 Low-cost floating house [7]

The above figure depicts the general idea of the floating house.

III. Proposed Design Consideration

It is recommended that 30 percent of total of the drum diameter be held as free board well above water surface when constructing the floating structure. Figure 2 [1] shows how to measure the overall buoyant power.

As seen in equation (1) [1], the centroid of the BCD component is T_1 from the drum's center.

$$T_1 \times area(BMCND) = \left(\frac{3\pi r - 4r}{3\pi}\right) area\ of\ semiciecle + \left(\frac{OP}{2} + r\right) BMND \quad (1)$$

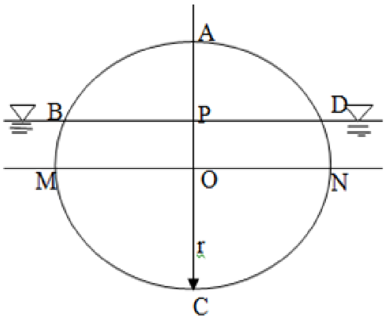

Figure 2. Evaluation of center of buoyancy [1]

A. Evaluation of moment of inertia (I)

Equations (2) and (3) [1] can be used to measure the moment of inertia for every drum along the middle line.

$$I_1 = \frac{1}{2} actual\ diameter\ of\ drum \times (length\ of\ drum)^3 \quad (2)$$

Moment of Inertia for any drum with respect to Y-Y axis is shown using equation (3) [1].

$$I = I_1 + 4.5^2 \left(\frac{1}{2} actual\ diameter\ of\ drum \times length\ of\ drum\right) \quad (3)$$

IV. Stability Analysis

If a floating body returns to its original state after a minor disturbance, it is considered to be stable. Depending on the relative location of the center of gravity (G) and center of buoyancy (B) as seen in figure 3 [1] two alternate moments can work on the floating body.

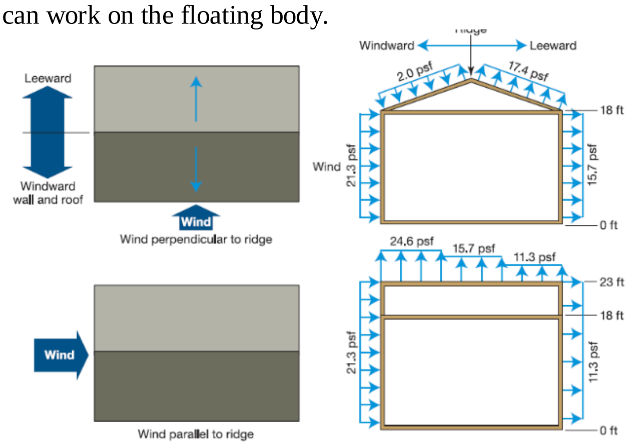

Figure 3 Lateral loads estimation [7]

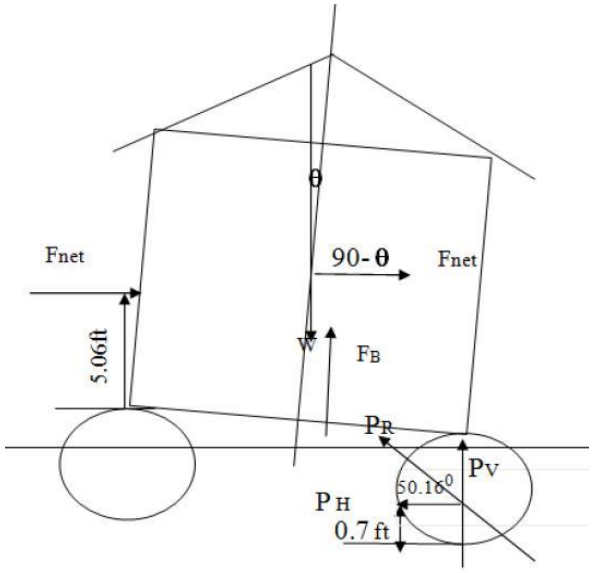

Fig.4 Overall stability of the whole structure with drums [1].

The above figure gives us the general idea of stability of the structure as a whole. We consider the structure which is above water level and the drums which are keeping it afloat as one single structure. This gives us the overall buoyancy and positive meta-centric height of the whole structure.

V. Evaluation Of Cost

Various types of floating bodies, including such drums, wheels, and ships, must be weighed when calculating costs and determining the most cost-effective and long-lasting structure [1, 2].

The cost of giant grass fenced house CI-sheet roofing above on drum was estimated to Rs. 100000 approximately. Whereas the cost varied to Rs. 200000 for CI-sheet fenced house with angle bar. But the stability and durability of CI-sheet structure was found to be more than the giant grass fenced structure.

TABLE I

COSTING AND ESTIMATION

Sr. No.	Materials	Quantity	Price (Rupees)
1	Fencing materials such as giant grass pillar, G.I. wire, mat, timer, nails, etc.	30 feet, x 60 feet	10, 000-15, 000
2	Roofing materials such as wood frame and rafter, giant glass purlin, and screw as well as C.I. sheet	4:12 slope	12, 000 approximately
4	Flooring materials such as wooden frame, bottom frame of giant grass mat, giant grass mat, nails and G.I. wire	As per five persons	10, 000 approximately
5	Float materials such as drum	As per five persons	15, 000 approximately
6	Workers' wages	As per five persons	25, 000 approximately

Evaluated cost = Rs. 1, 00,000

The above table helps us to take a look at various construction materials and their prices that can be used in the floating house.

VI. SUMMARY AND DISCUSSIONS

From an engineering standpoint, the planned floating house is robust, and it is economically feasible if built with readily sourced materials. The information and architecture scriptures of such floating houses must reach out to the number of influential across multiple outlets in order to encourage them to use such a life-saving technique.

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