Basic Design of Floating Breakwater Structures That Suitable for Indonesian Waters

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OUTLINES

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BACKGROUND

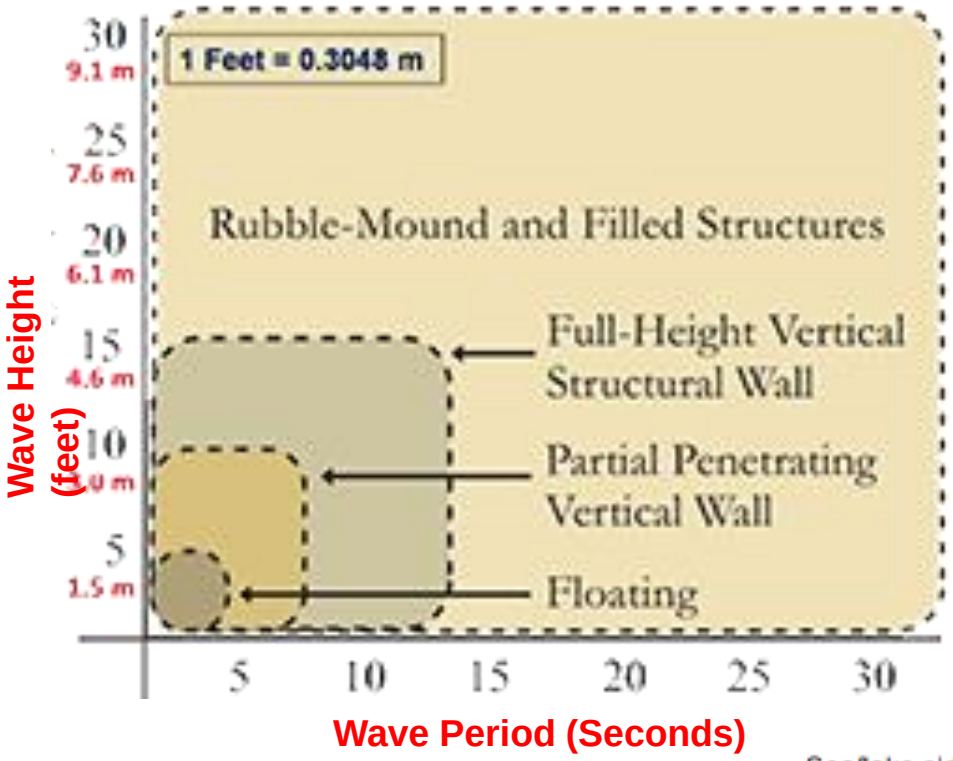
BACKGROUND

- The ideal port should locate in a protected area and accommodate the movement of the vessel that will lean so that the ship can loading or unloading safely, with this requirement the waves in the basin pool must be relatively calm.
- Generally, breakwater is designed to reduce the wave height that comes to the area that will be protect.
- The construction of a floating structure in the sea, especially the large size, is not a new idea, initially introduced by Edward R Armstrong who initiated a sea drone as a runway in the middle of the sea in 1920.
- This study aims to develop the basic design of a floating breakwater building structure to anticipate water conditions, especially in Eastern parts of Indonesia (**case in Sausapor-Sorong**).

BACKGROUND (2)

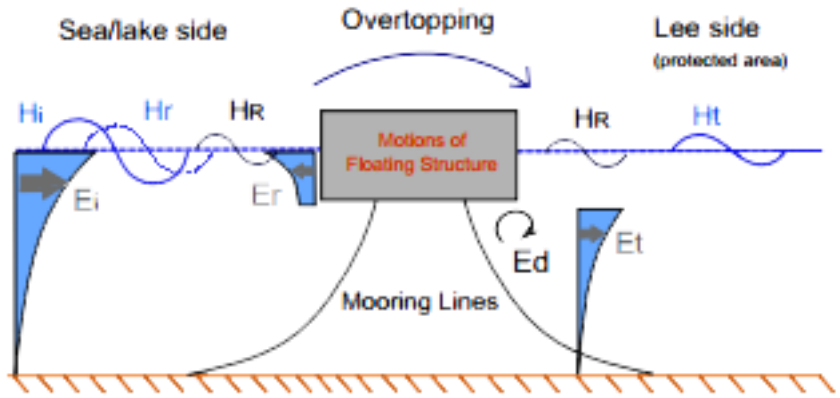
Ship at berth	H_s at berth
Marinas	0,15
Fishing boats	0,40
General Cargo (<30.000 dtw)	0,70
Bulk Cargo (<30.000 dtw)	0,80
Bulk Cargo (30.000-10.000 dtw)	0,80-1,50
Oil Tanker (<30.000 dwt)	1,00
Oil Tanker (30.000-150.000 dtw)	1,00-1,70
Passenger Ship	0,70

BACKGROUND (3)



The general structure of the floating breakwater will function effectively in waters with a wave height below 5 ft or around 1.5 meter

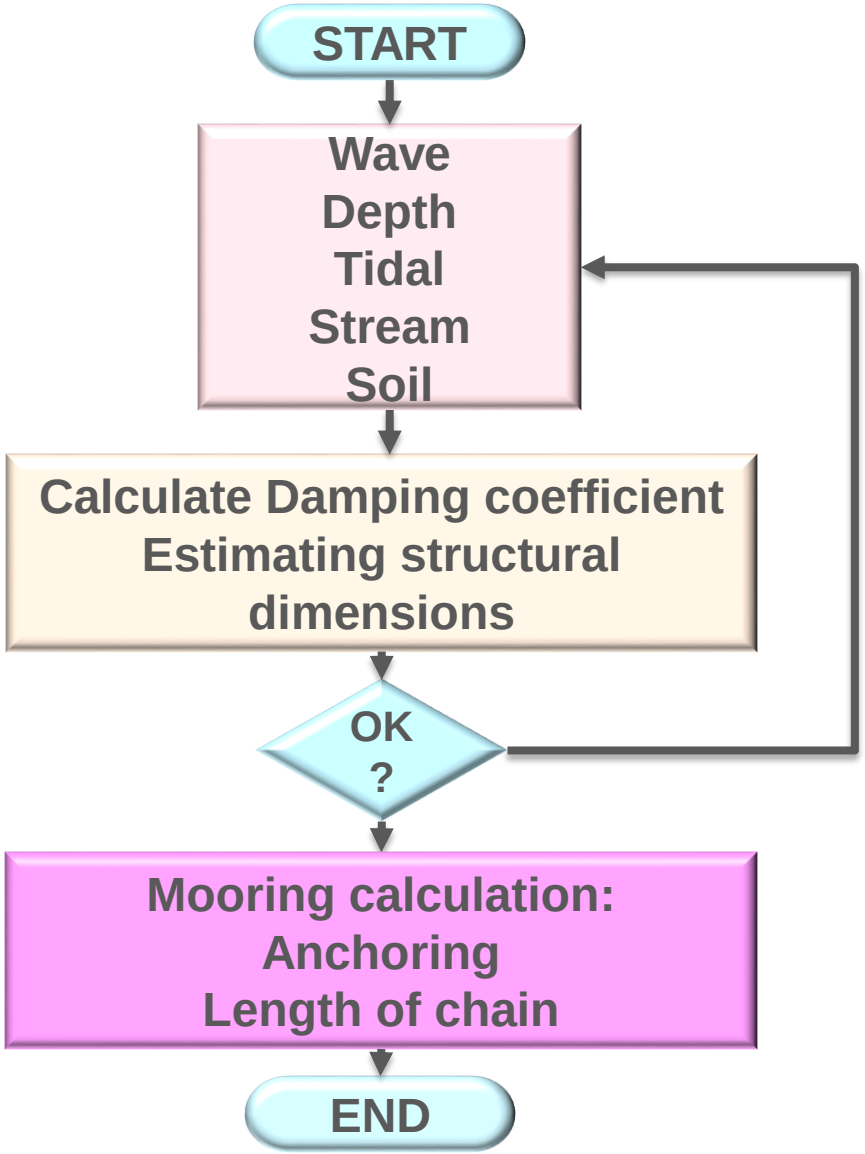
Various forms of floating breakwater will give different wave attenuation effects. In general it can be categorized: Box type, Pontoon type, Mat-type, Tethered float type.



HR = radiated wave height
Hi = incident wave height
Hr = reflected wave height
Ht = transmitted wave height
Ei = incident wave energy
Er = reflected wave energy
Et = transmitted wave energy
Ed = energy dissipation

METHODS

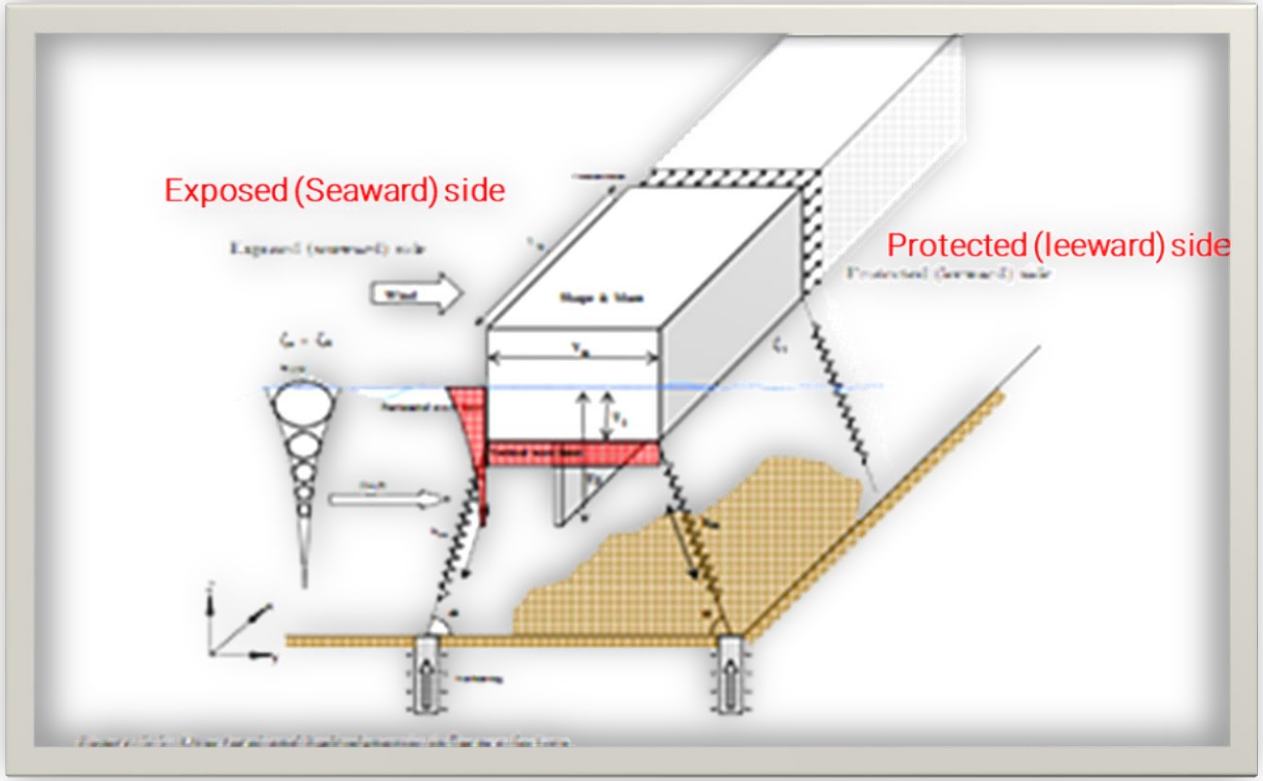
METHODS

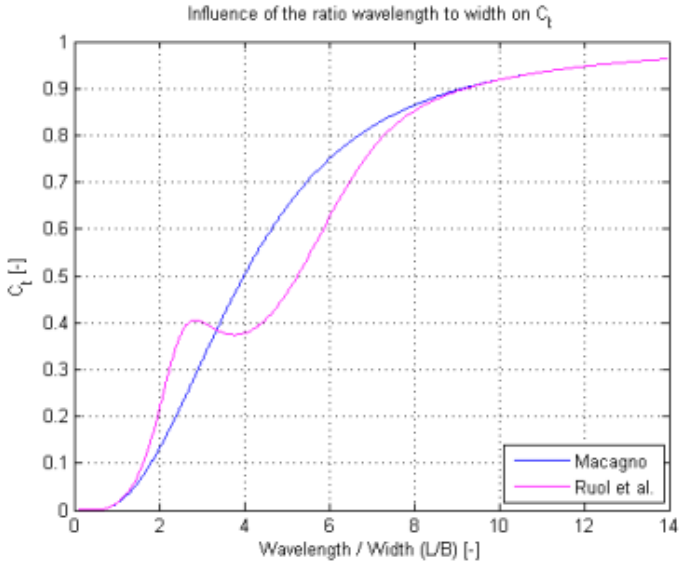

START
Wave
Depth
Tidal
Stream
Soil
Calculate Damping coefficient
Estimating structural dimensions
OK ?
Mooring calculation:
Anchoring
Length of chain
END

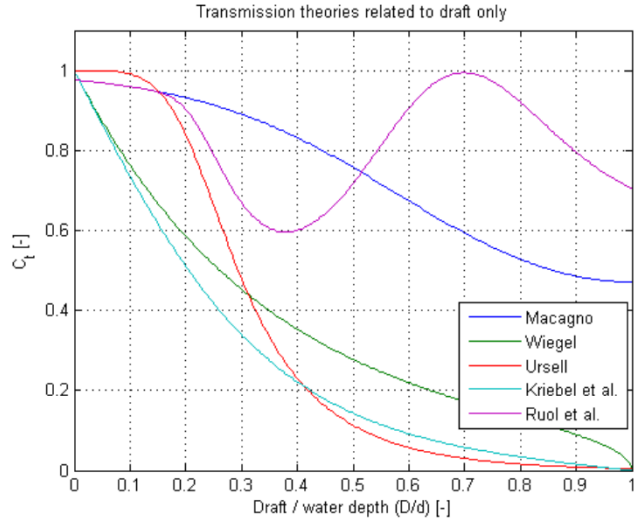
METHODS (2)

Floatingbreakwater's dynamic behavior is influenced by various factors. These factors can be divided into 3 parts:

- Influence from the environment
- Effects of the mooring system
- Effects of other breakwater segments.







k_m	: Spring stiffness of the mooring system (kg/s)
L_w	: length of element floating breakwater (m)
T_1 (D)	: floating parts *breakwater* (m)
Y_w(B)	: width of floating parts *breakwater* (m)
ζ_a	: wave amplitude comes (m)
ζ_R	: reflected amplitude wave towards the sea (m)
ζ_T	: amplitude wave transmission towards port (m)

RESULT AND DISCUSSION

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1. Based on Metrologi station in Sorong, the wave height is considered as 1.1 meter, in this condition, very suitable to install floating breakwater.
2. To be assumed that floting breakwater installed in dept water around 12 meter.
3. the value of Ct = 0.14 then we can get the L / B value between 1.8 - 2.0. In this initial design calculation we use the middle value, L / B = 1.9.
4. Then we get the dimensions of the breakwater width (B) around 7.15 m. In this case we assume to be 7 m.
5. The length of the breakwater is very dependent on the area that we want to protect. In this case it is assumed that the protected area is twice the width of the existing pier.
6. By accommodating the current Sausapor dock width is 8m, it can be estimated that the length of the floating breakwater structure is around 20 m.
7. Then the results of the pertinent dimensions of the breakwater can be seen in the results section of the initial design of the floating breakwater structure.

CONCLUSION

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1. basic floating breakwater design, namely Lw (breakwater length) is 16 meters, B (width) = 7.15 meters, D (draft) = 5 meters, Ct = 0.14, Hi = 1.1 meters and Ht = 0.15 meters.

2. The results of the initial design have not taken into account the current mooring and loading conditions. This requires more detailed data regarding soil types and flows. Land data is obtained through geotechnical testing of soil characteristics around the site.

THANK YOU