



Basic Design of Floating Breakwater Structures That Suitable for Indonesian Waters

Teguh Pairunan Putra

Researcher for Sea Transport Center

Research and Development Agency of Ministry Transportation Indonesia

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BACKGROUND

BACKGROUND

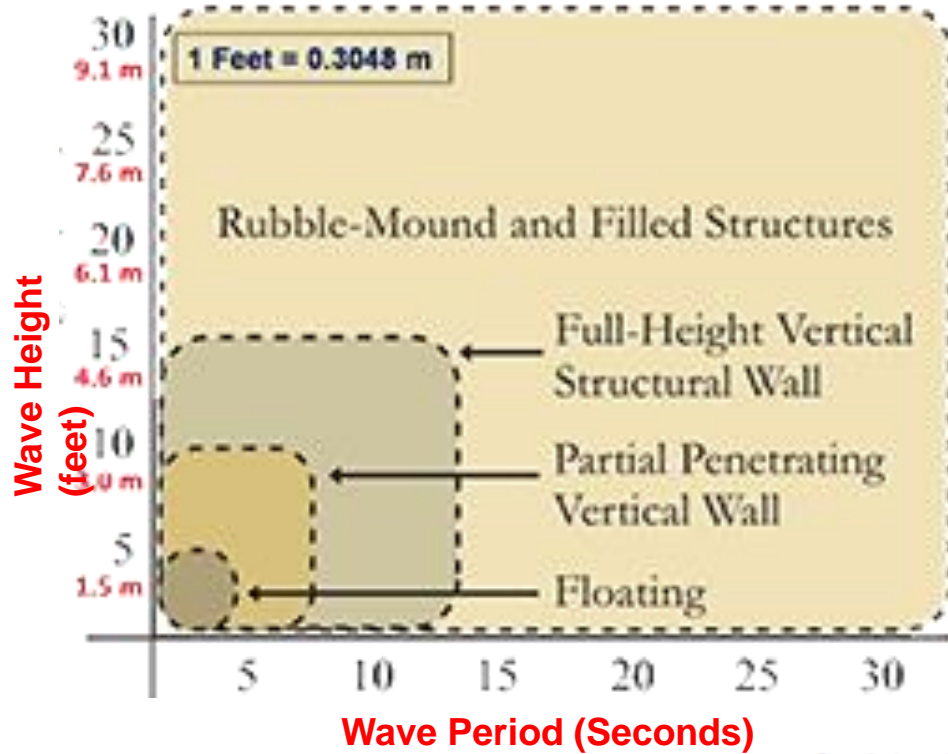
- The ideal port should locate in a protected area and accommodate the movement of the vessel that will lean so that the ship can loading or unloading safely, with this requirement the waves in the basin pool must be relatively calm.
- Generally, breakwater is designed to reduce the wave height that 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)

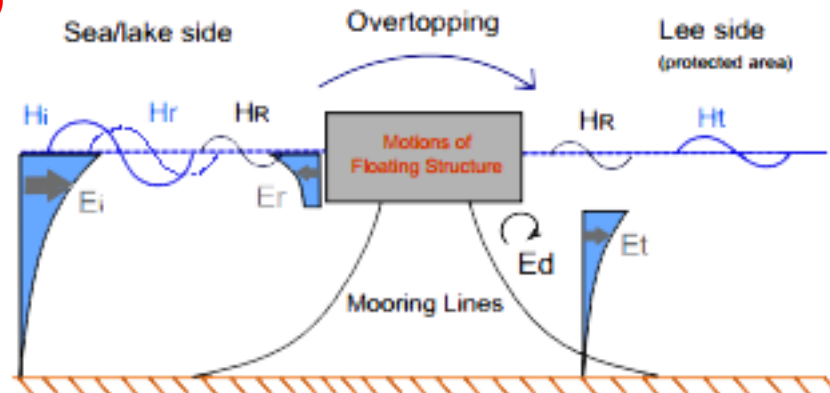
Ship at berth	H_s at berth
Marinas	0,15
Fishing boats	0,40
General Cargo (<30.000 dtw)	0,70
Bulk Cargo (<30.000 dtw)	0,80
Bulk Cargo (30.000-10.000 dtw)	0,80-1,50
Oil Tanker (<30.000 dwt)	1,00
Oil Tanker (30.000-150.000 dtw)	1,00-1,70
Passenger Ship	0,70

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.



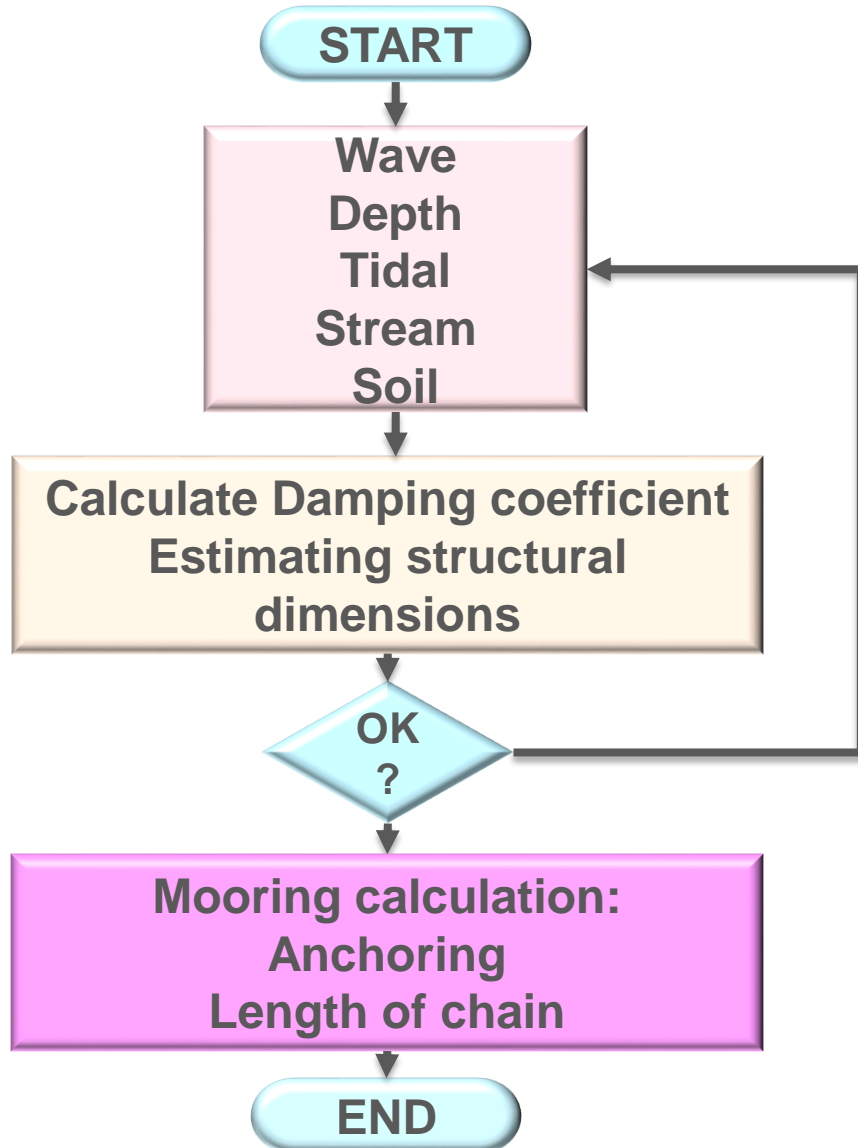
- H_R = radiated wave height
- H_i = incident wave height
- H_r = reflected wave height
- H_t = transmitted wave height
- E_i = incident wave energy
- E_r = reflected wave energy
- E_t = transmitted wave energy
- E_d = energy dissipation





METHODS

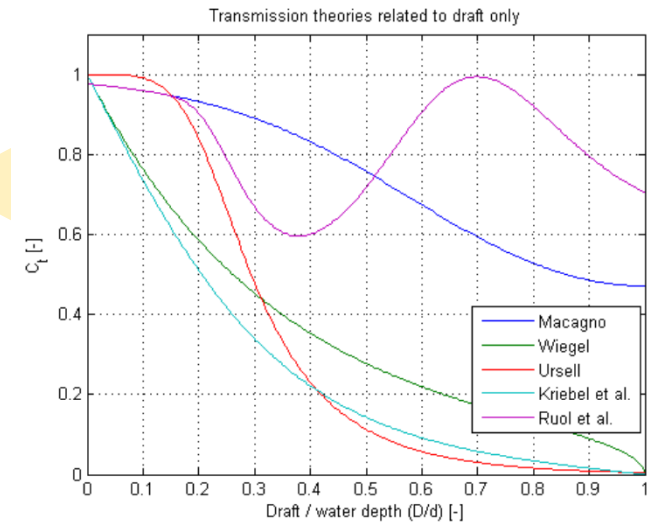
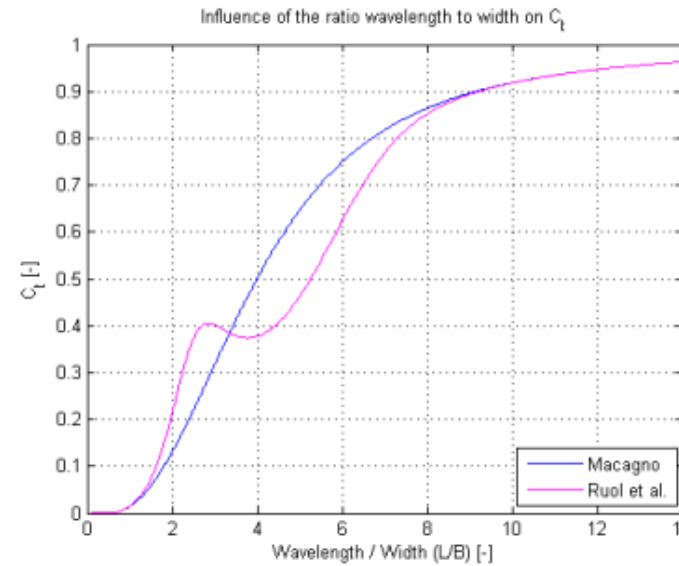
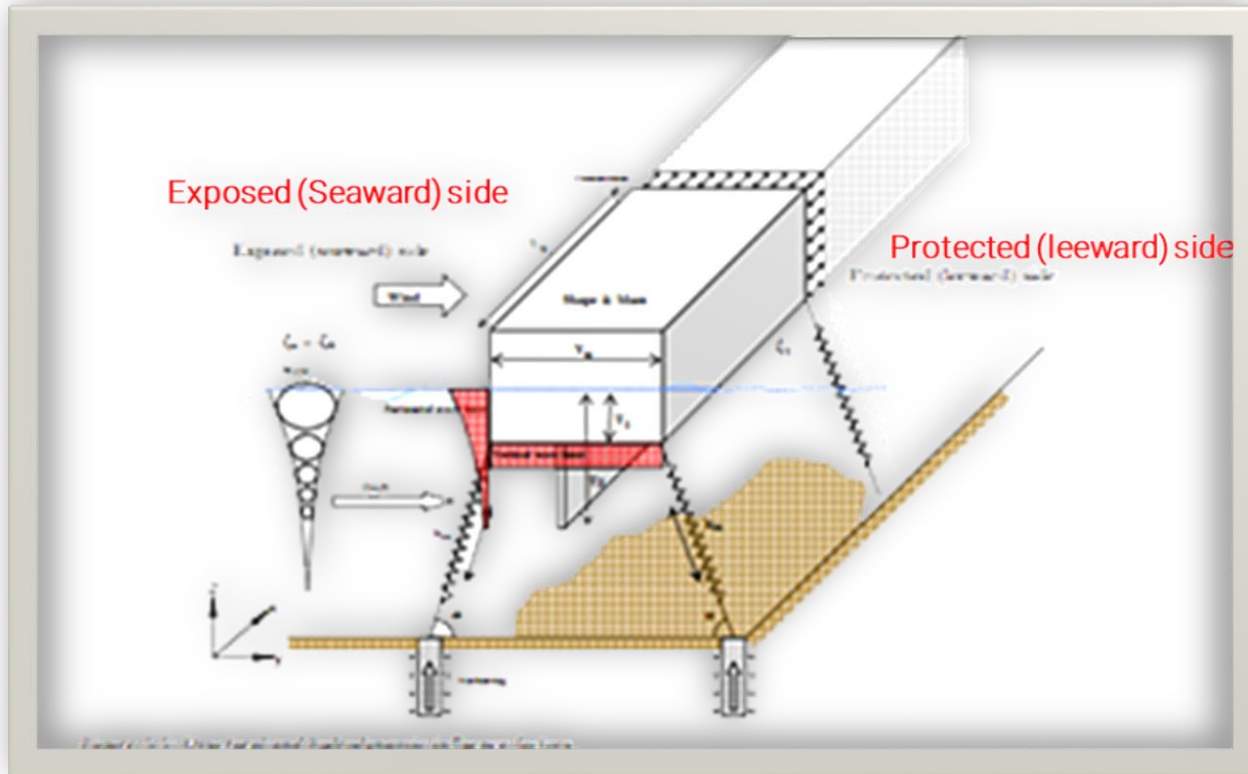
METHODS



METHODS (2)

Floating breakwater'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)
- C_a : wave amplitude comes (m)
- C_R : reflected amplitude wave towards the sea (m)
- C_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 floating breakwater installed in dept water around 12 meter.
- 3** the value of $C_t = 0.14$ 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 L_w (breakwater length) is 16 meters, B (width) = 7.15 meters, D (draft) = 5 meters, $C_t = 0.14$, $H_i = 1.1$ meters and $H_t = 0.15$ 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.





End

THANK YOU