

Ship Stability

Ch. 7 Inclining Test

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Contents

- ☑ Ch. 1 Introduction to Ship Stability
- ☑ Ch. 2 Review of Fluid Mechanics
- ☑ Ch. 3 Transverse Stability Due to Cargo Movement
- ☑ Ch. 4 Initial Transverse Stability
- ☑ Ch. 5 Initial Longitudinal Stability
- ☑ Ch. 6 Free Surface Effect
- ☑ **Ch. 7 Inclining Test**
- ☑ Ch. 8 Curves of Stability and Stability Criteria
- ☑ Ch. 9 Numerical Integration Method in Naval Architecture
- ☑ Ch. 10 Hydrostatic Values and Curves
- ☑ Ch. 11 Static Equilibrium State after Flooding Due to Damage
- ☑ Ch. 12 Deterministic Damage Stability
- ☑ Ch. 13 Probabilistic Damage Stability



Ch. 7 Inclining Test

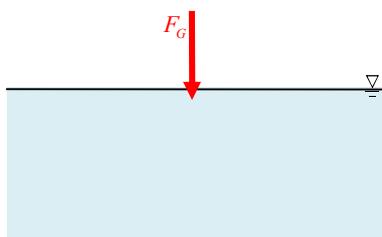
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Naval Architectural Calculation, Spring 2018, Myung-II Roh

The Problem of Finding an Accurate Vertical Center of Gravity (KG)

The problem of finding an accurate vertical center of gravity for the ship's designer.

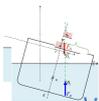
for a ship is a serious one



✓ Any difference in the weight of structural parts, equipment, or welds in different ship will produce a different KG.



 There is an accurate method of finding KG for any particular ship and that is .



Required Values to Find the KG (1/3)

$$\tau_r = F_B \cdot GZ$$

The purpose of the inclining test is in an accurately known condition.

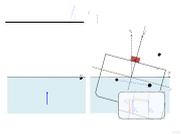
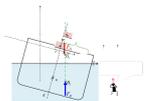


Required values to find the KG

- Draft
- Total weight (F_G)
- Hydrostatic values (KB, BM)
- Weight (w)
- Distance (d)
- Angle of inclination (ϕ)*

5





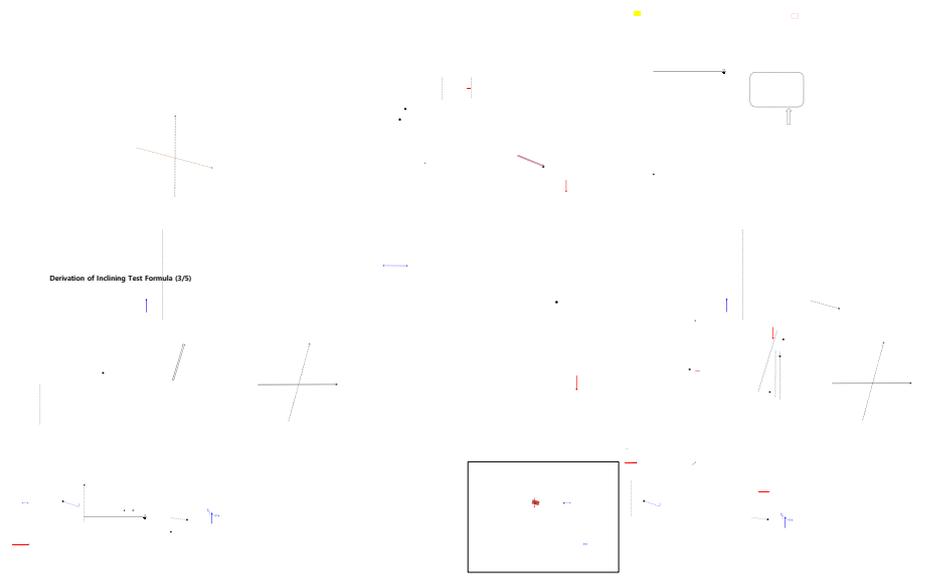
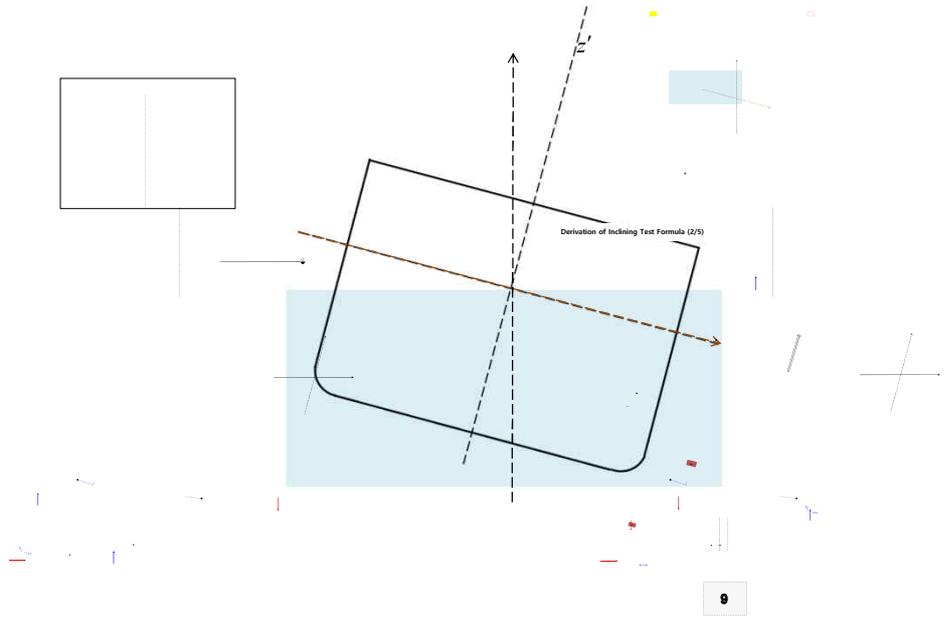
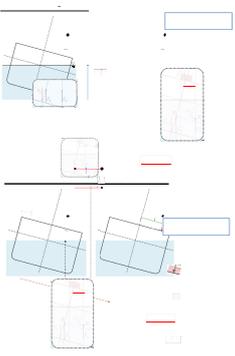
$$KG = \frac{BM}{\tan \phi} - GM$$

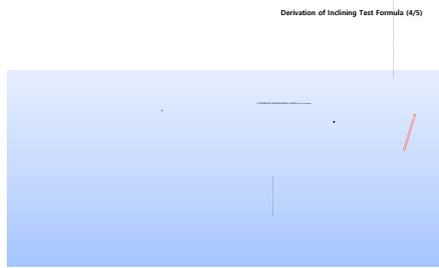
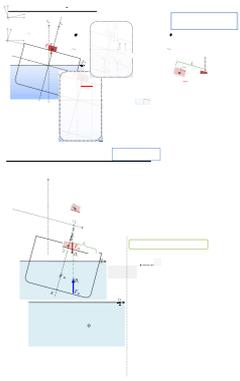
$$= \frac{w \cdot d}{F_G \cdot \tan \phi}$$

Required Values to Find the KG (3/3)

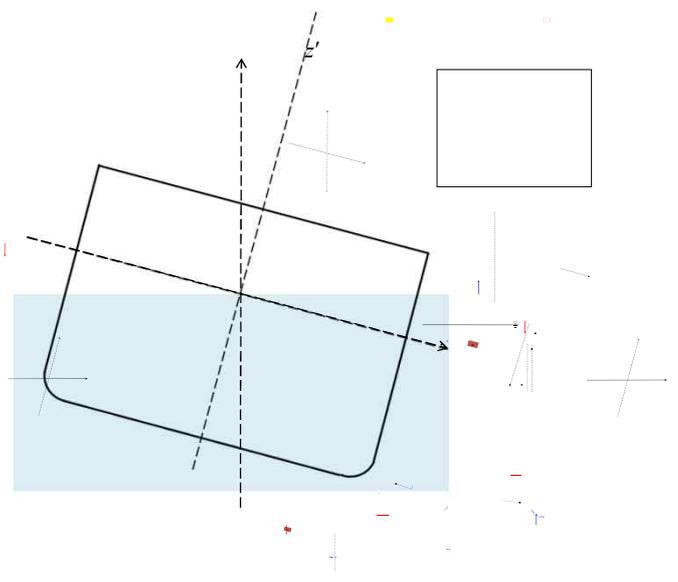


Support that the number of
empty is correct and it is 3/3
It represents the righting arm.

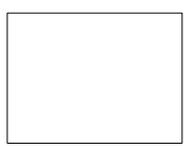




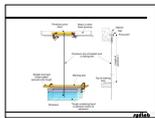
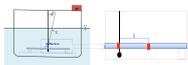
Derivation of Inclining Test Formula (4/5)



11

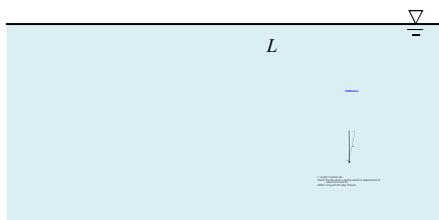


(Answer provided by test weight & force)



Method of Measuring the Angle of Inclination (1/2)

How can you measure the **angle of inclination** when you perform the inclining test?



Various Problems Using the Inclining Test Formula

$$GM = \frac{w \cdot d}{F_G \cdot \tan \phi} \quad \text{Inclining test formula}$$

The inclining test formula can be used in various problems as follows:

- (1) To find the angle of heel ϕ , a ship will take by moving a weight a transverse distance d .
- (2) To find the weight w necessary to remove or produce a heel by moving it a transverse distance d .
- (3) To find the distance d necessary to move a weight in order to remove or produce a heel.