Ship Stability

Ch. 7 Inclining Test

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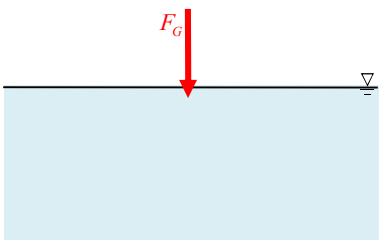
Ch. 7 Inclining Test

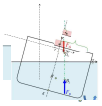
The Problem of Finding an Accurate Vertical Center of Gravity (KG)

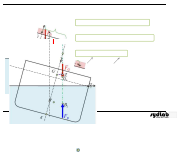
The problem of for a ship is a serious one for the ship's designer.



✓ 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 .

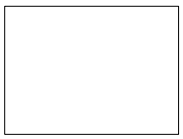




Required Values to Find the KG (1/3)

$$\tau_r = F_B \cdot GZ$$

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)*

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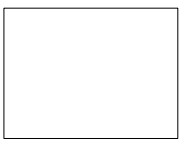
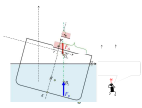
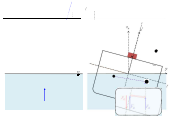
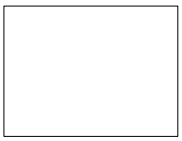




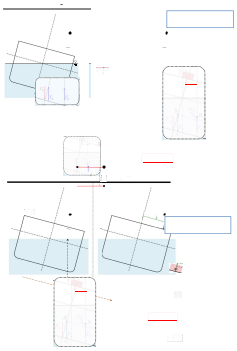


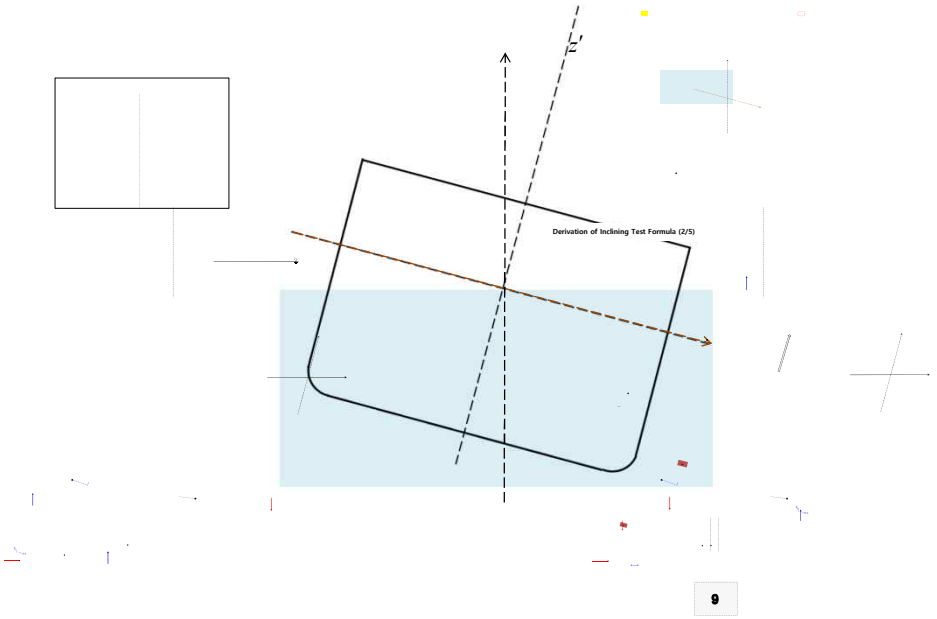


$$KG = \text{[illegible]} - BM - GM$$

$$= \frac{w \cdot d}{F_G \cdot \tan\phi} - \text{[illegible]}$$

Required Values to Find the KG (3/3)




Derivation of Inclining Test Formula (2/5)
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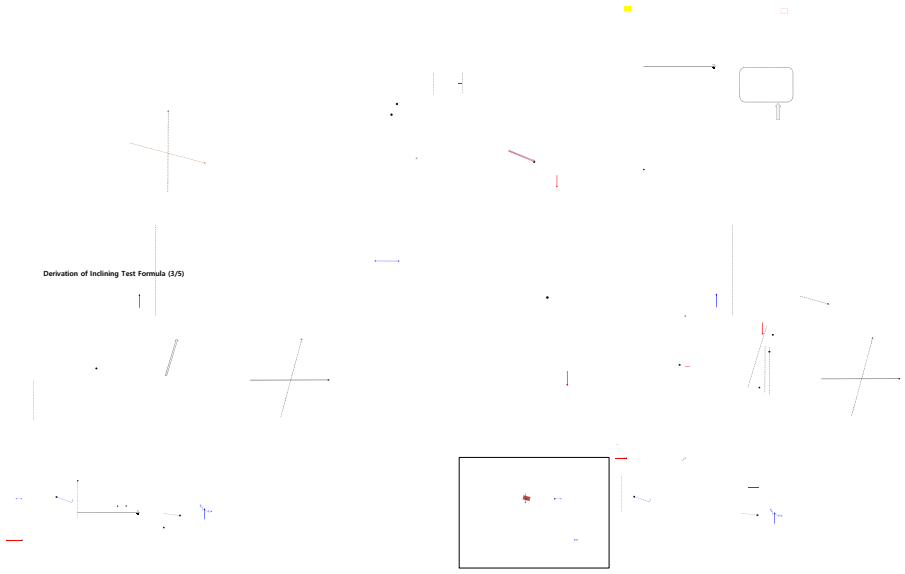
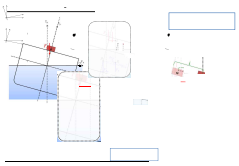
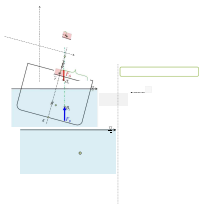
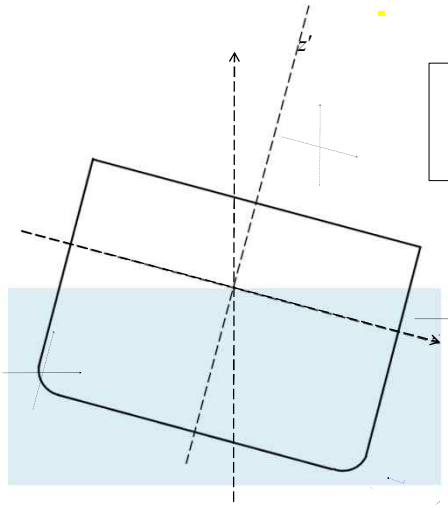

Derivation of Inclining Test Formula (3/5)





Derivation of Inclining Test Formula (4/5)



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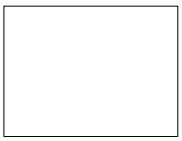
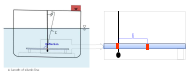
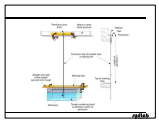
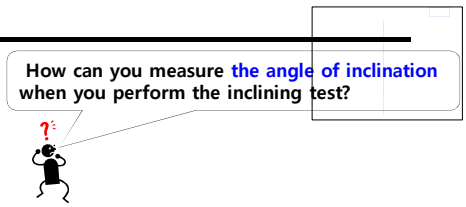
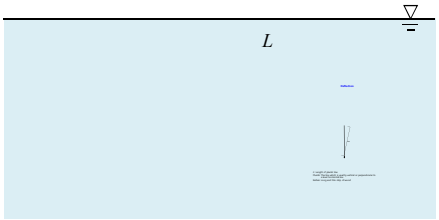


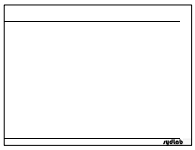




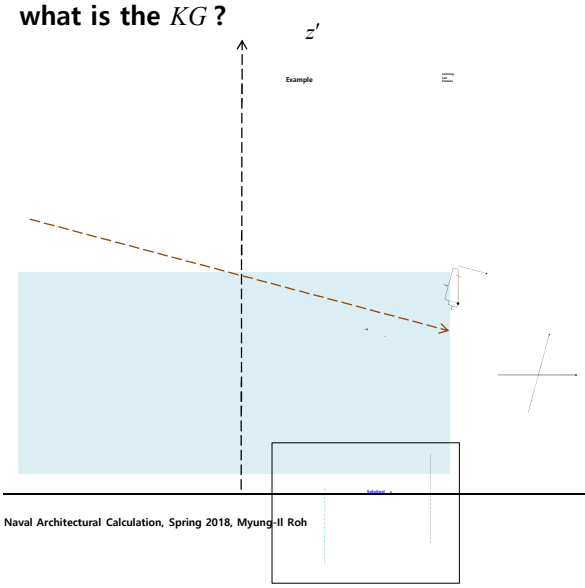
Method of Measuring the Angle of Inclination (1/2)







A ship is inclined by moving a weight of $40\ tons$ **a distance** $8\ m$ **from the center line. A** $12\ m$ **pendulum shows a deflection of** $0.3\ m$**.**
Displacement of the ship is $3{,}700\ tons$**. If the** KB **is** $5\ m$ **and** BM **is** $14\ m$**, what is the** KG **?**



Various Problems Using the Inclining Test Formula

$$GM = \frac{w \cdot d}{E_o \cdot \tan\phi}$$ 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.