

HOW TO DETERMINE STABILITY OF FLOATING BODY

If center of gravity (CG) below metacenter, then tilt causes restoring couple.

If CG is above metacenter then tilt causes overturning couple and body will capsize.

Stability governed by (SEE FIGURE ON PAGE 2)

$$\overline{MG} = \frac{I}{V} - \overline{GB}, \text{ where}$$

\overline{MG} , the metacentric height – a quantitative measure of a ships stability

I = moment of inertia of waterline area about roll axis, for rectangular shapes,

$$I = \frac{Lw^3}{12}.$$

V = displaced volume of the vessel (submerged volume).

\overline{GB} is the original distance between the center of gravity (CG) and the center of buoyancy (CB).

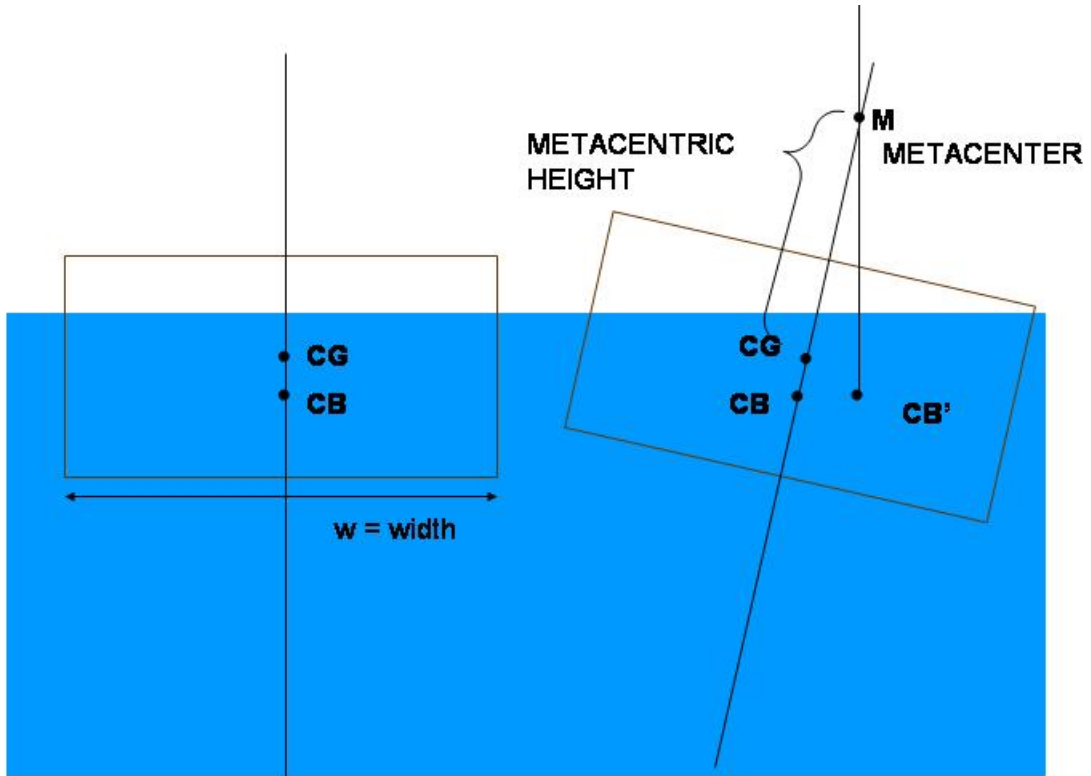
If $\overline{MG} > 0$, then stable.

IF $\overline{MG} < 0$, then unstable

NOTE, unlike submerged bodies, a CG above CB does not necessarily dictate an unstable scenario since the CB shifts when the vessel shifts (SEE FIGURE ON PAGE 3).

IF CG below CB then always stable.

Definition Sketch for Stability of Floating Bodies.



Stability Variation as Related to Location of the Center of Gravity (CG).

