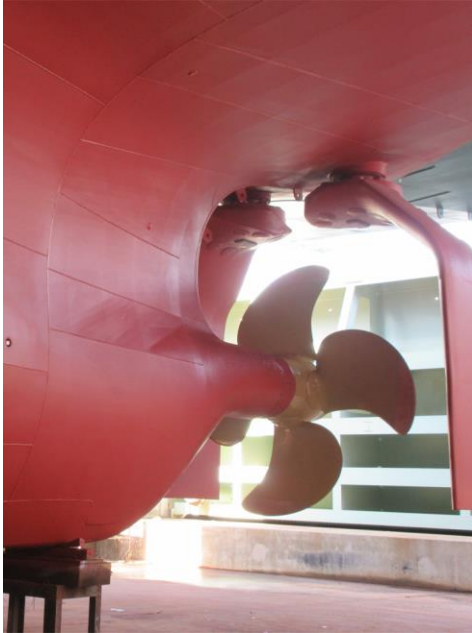


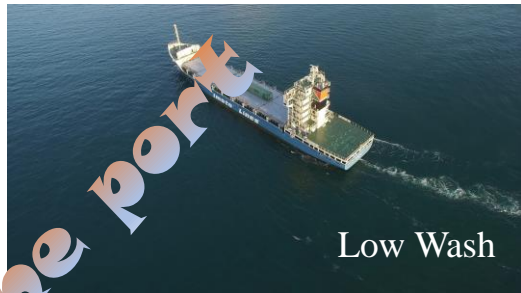
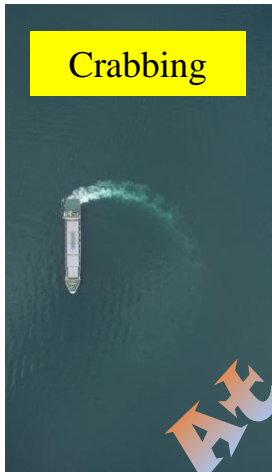
Gate Rudder Design Concept



Optimal Design of Gate Rudder

Design Point

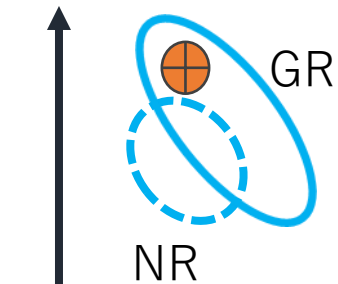
NR: Normal Rudder GR: Gate Rudder



At the Port

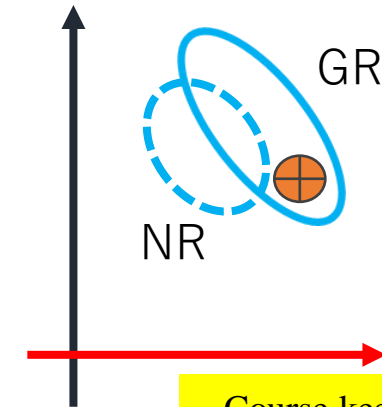


Turning



Course keeping

Turning

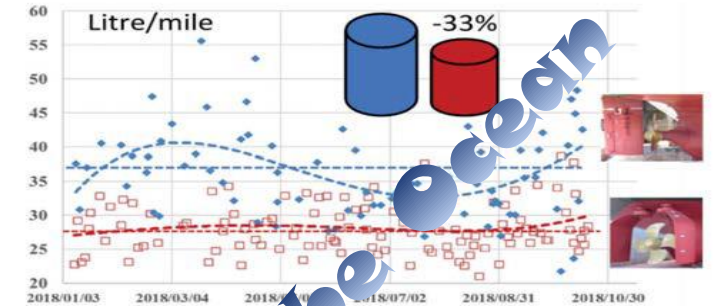


Course keeping



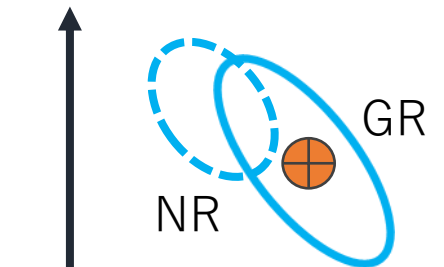
Coastal Vessel

Ocean Going Vessel



The gate rudder should be optimized for the best energy saving

Turning

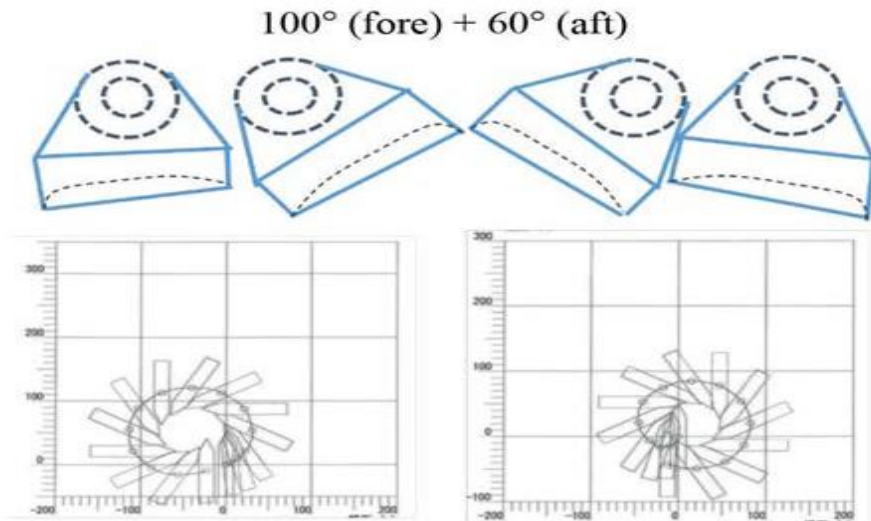


Course keeping

At the Port

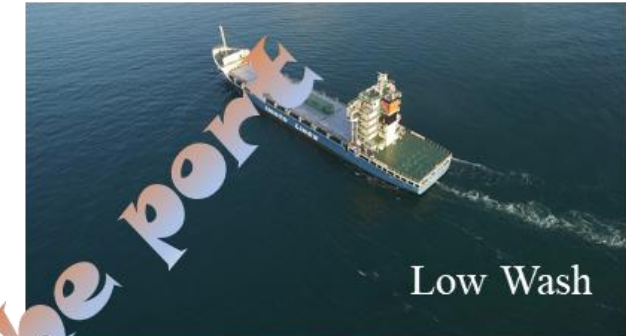
Generally speaking, the strong manoeuvrability will be required to the vessel except ocean going vessels which can be escorted by tag boat(s)
The Gate Rudder can provide superior circle motion by using crabbing mode as shown in the below figure

Crabbing Modes

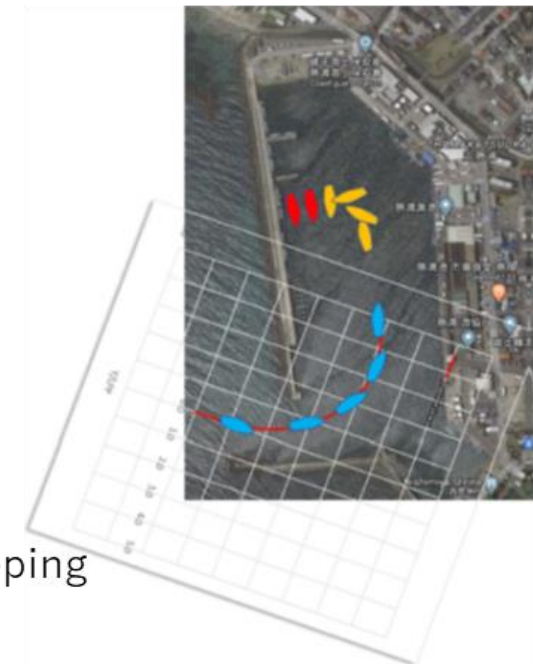
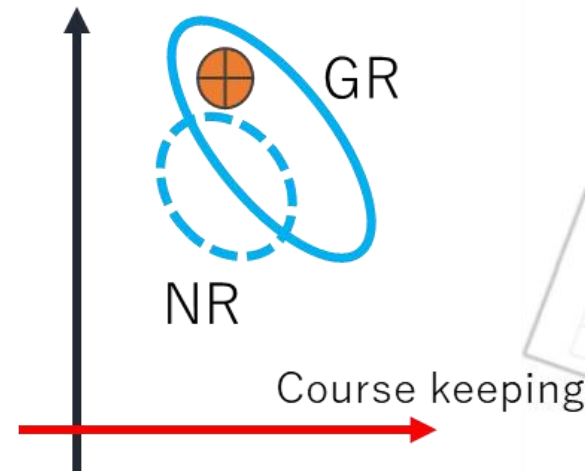


 Design Point

NR: Normal Rudder GR: Gate Rudder



Turning



Near Coast

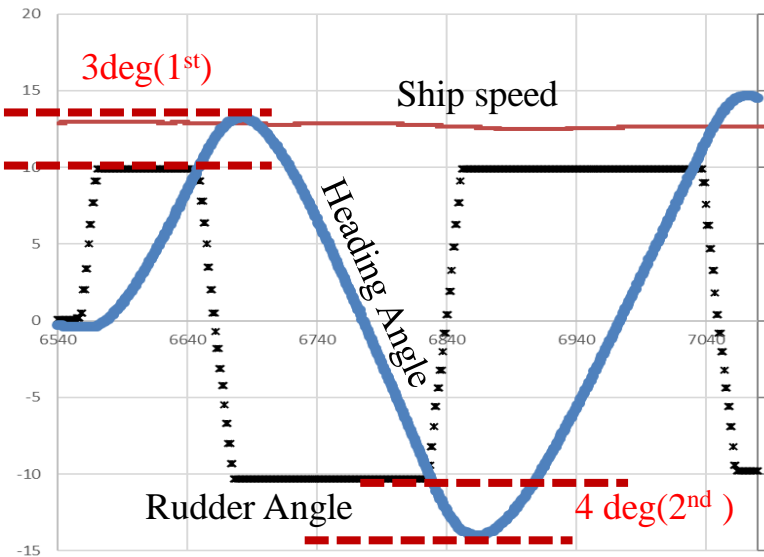


The course keeping ability is the most important performance of coastal vessels because their routes are always narrow and winding. Addition to this difficulty, the busy traffic sometimes makes the vessel get closer each other.

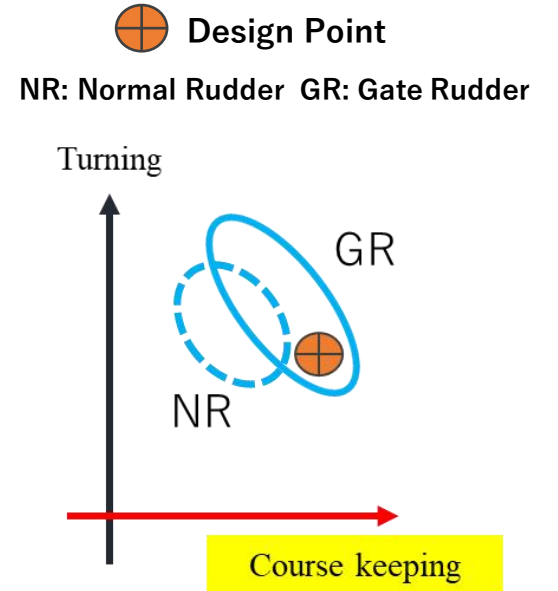
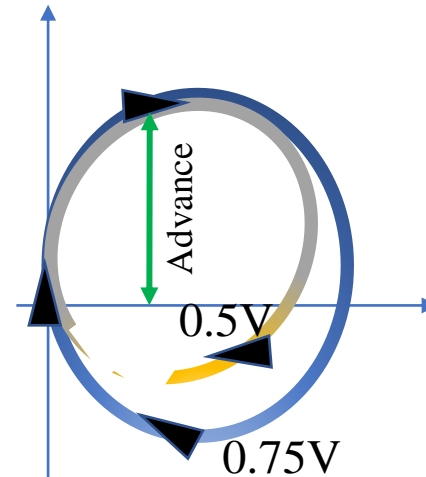
Another required performance is short advance and stopping ability to avoid traffic accidents. Gate rudder has a special trend of the circle motion. Because of the low resistance of the rudder, **turning speed is higher** than conventional rudder as shown below.

Course Keeping Ability

10 deg. Zig Zag Test



Safety Turning

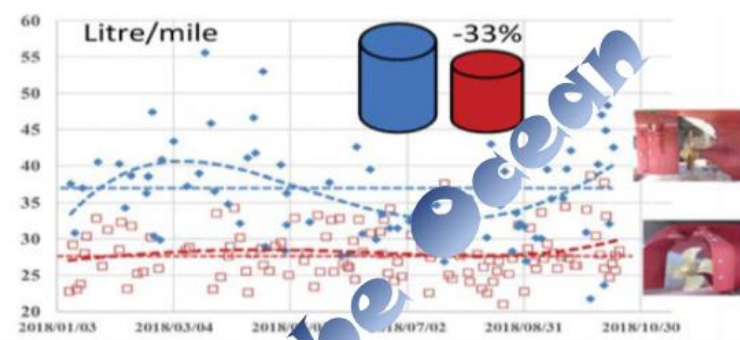


Coastal Vessel

At the ocean

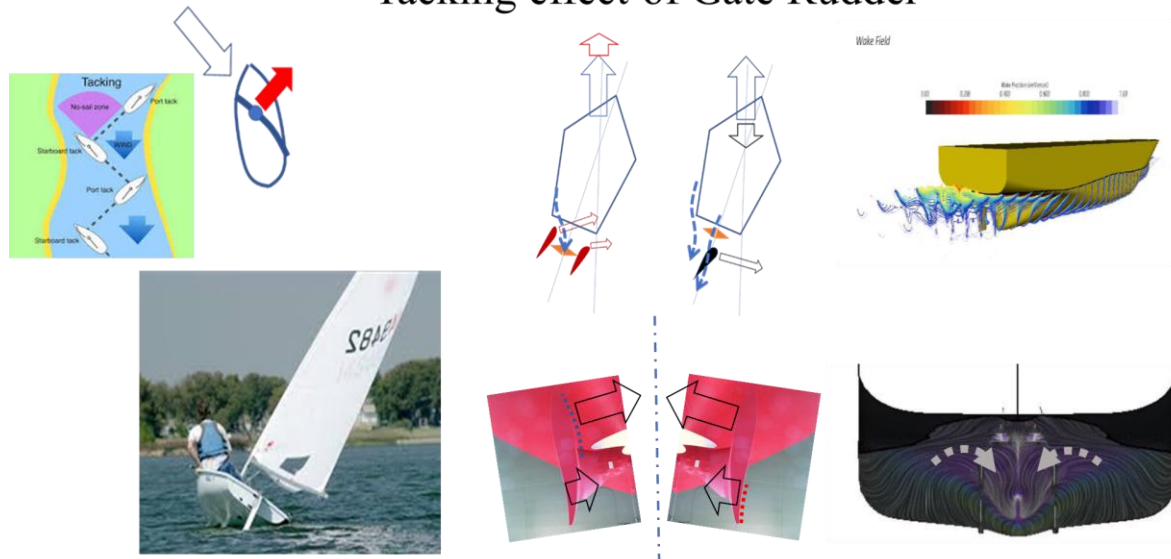
The manoeuvrability is slightly less important and energy saving function will be strongly required. In order to satisfy this requirement, the Gate rudder should be designed so as to produce the maximum thrust by the rudder blades. The gate rudder will generate more thrust when the vessels is yawing or rolling in the ocean.

Ocean Going Vessel



The gate rudder should be optimized for the best energy saving

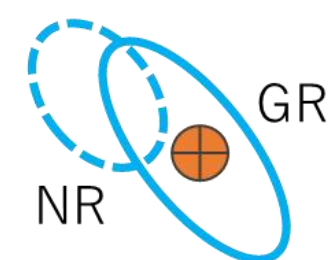
Tacking effect of Gate Rudder



Turning

Design Point

NR: Normal Rudder GR: Gate Rudder



Course keeping