Presenting

PIANC

The World Association for Waterborne Transport Infrastructure

Presentation by
Evert Lataire

at the occasion of
PIANC BELGIUM

May 31 2021 / (online)
Date / Venue

InCom

Chairperson Mr Philippe Rigo (Belgium)
Deals with all matters related to inland navigation

InCom WG 141: Design Guidelines for Inland Waterway Dimensions (2019)

MarCom WG 121: Harbour Approach Channels - Design Guidelines (2014)

This report provides guidelines and recommendations for the design of ***vertical and horizontal dimensions*** *of harbour approach* ***channels*** *and the manoeuvring and anchorage areas within harbours, along with defining restrictions to operations within a channel. It includes guidelines for establishing* ***depth and width requirements****, along with vertical bridge clearances.*

Date / Venue

FACULTY OF ENGINEERING AND ARCHITECTURE

Vastgelopen containerschip Ever Given op het Suezkanaal

MARITIME TECHNOLOGY
Prof. Evert LATAIRE

UNIVERSITEIT GENT

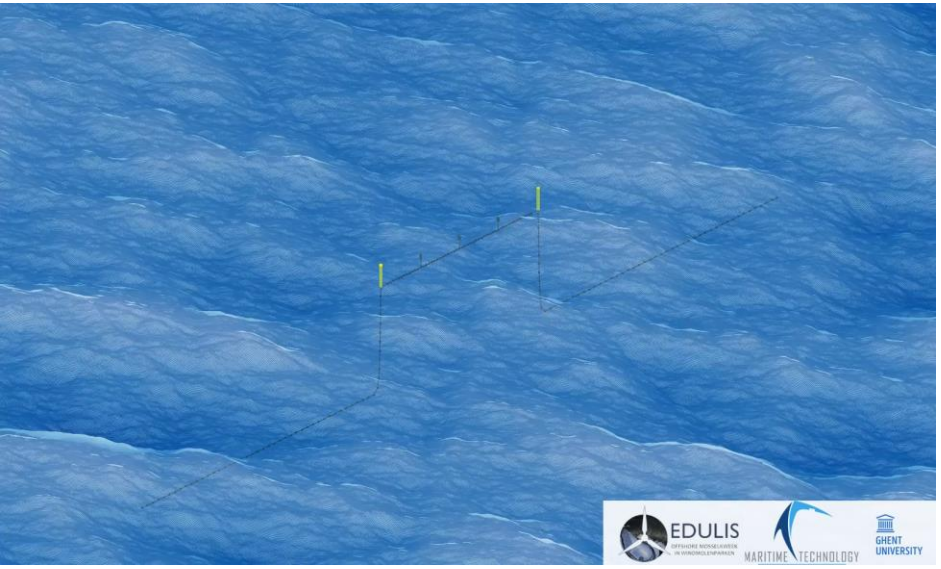
MARITIEME TECHNIEK
UNIVERSITEIT GENT

GHENT
UNIVERSITY

MARITIME TECHNOLOGY
GHENT UNIVERSITY

AQUACULTURE

mussels, seaweed



OTHER

PV panels, floating WT

SHIPS

Knowledge Centre

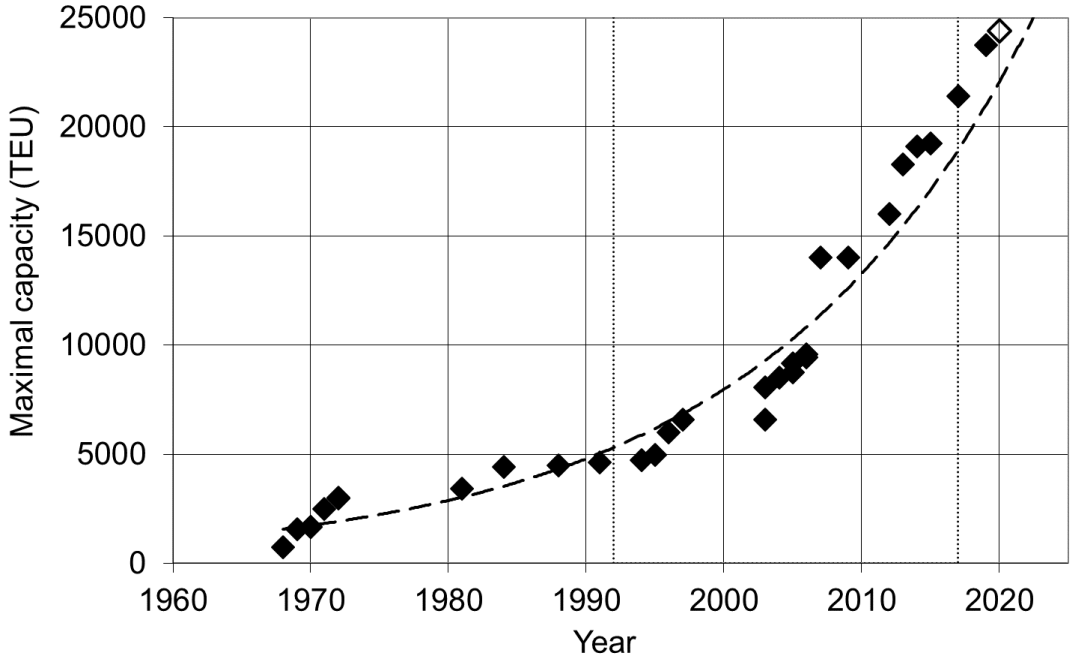
- **Knowledge Centre SHIP MANOEUVRING IN SHALLOW AND CONFINED WATER**
- **Two Partners:**

GHENT UNIVERSITY

Waterbouwkundig Laboratorium

Vlaanderen is wetenschap

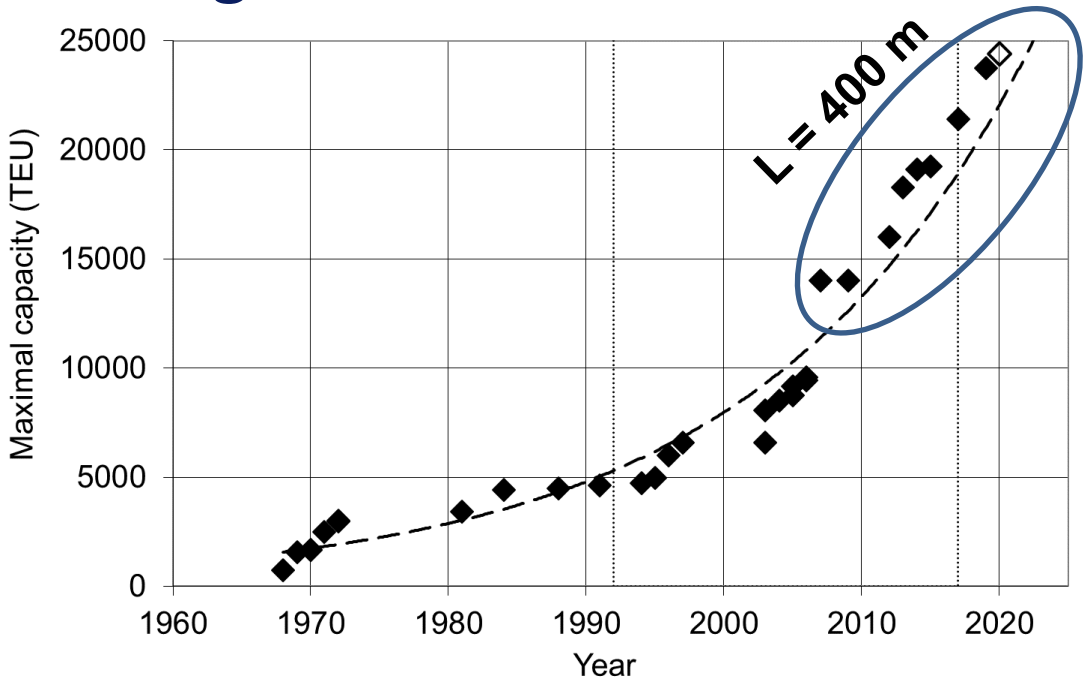
Evolution of ship characteristics: e.g. container carriers



1988
< 5000 TEU
L = 318 m; B = 42 m; T = 14 m

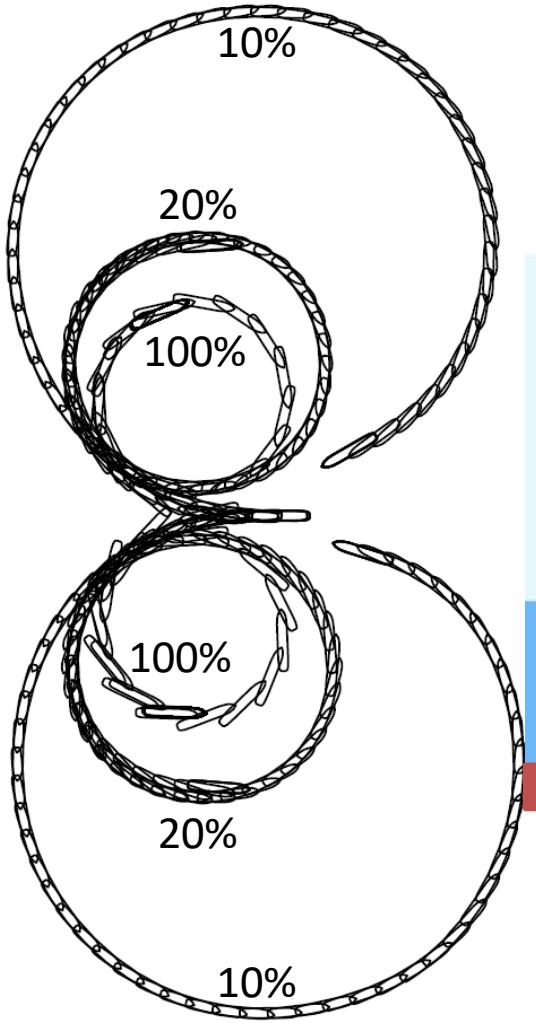
2017
> 20000 TEU
L = 399 m; B = 59 m; T = 16 m

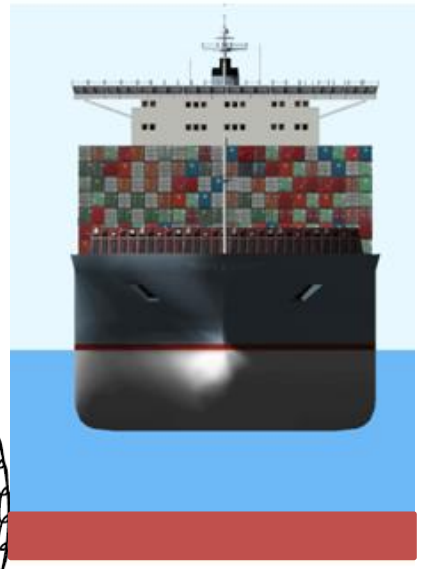
Evolution of ship characteristics: e.g. container carriers



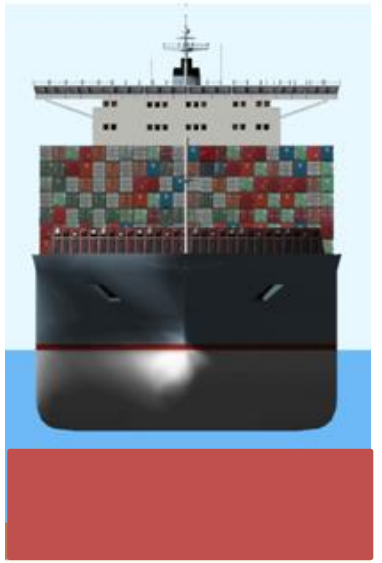
1988
< 5000 TEU
L = 318 m; B = 42 m; T = 14 m

2017
> 20000 TEU
L = 399 m; B = 59 m; T = 16 m

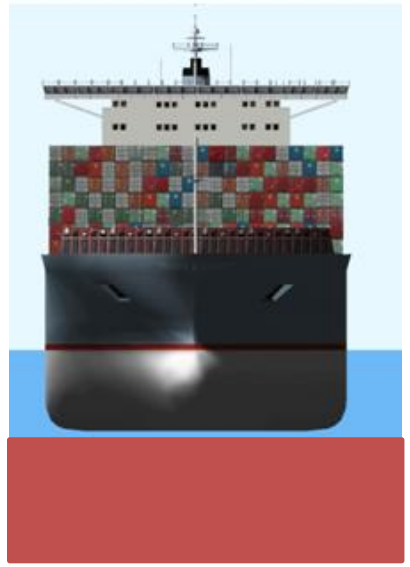




UKC 100%
medium deep
medium shallow



UKC 20%
shallow



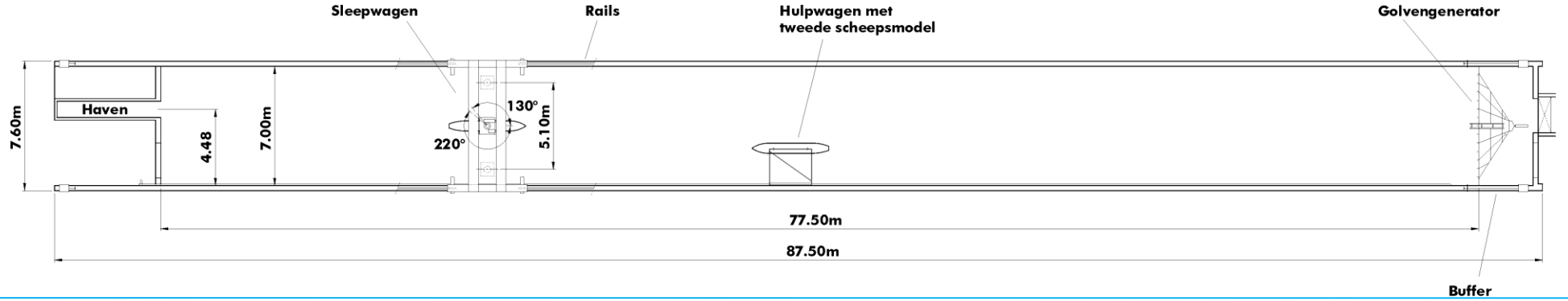
UKC 10%
very shallow

Characteristics and features

Towing Tank for Manoeuvres in Confined Water

(co-operation Flanders Hydraulics Research – Ghent University)

Total length	87.5 m
Width	7.0 m
Maximum water depth	0.5 m
Model length	3.5 - 4.5 m



GHENT UNIVERSITY

MARITIME TECHNOLOGY
GHENT UNIVERSITY

Flanders Maritime Laboratory

GHENT UNIVERSITY

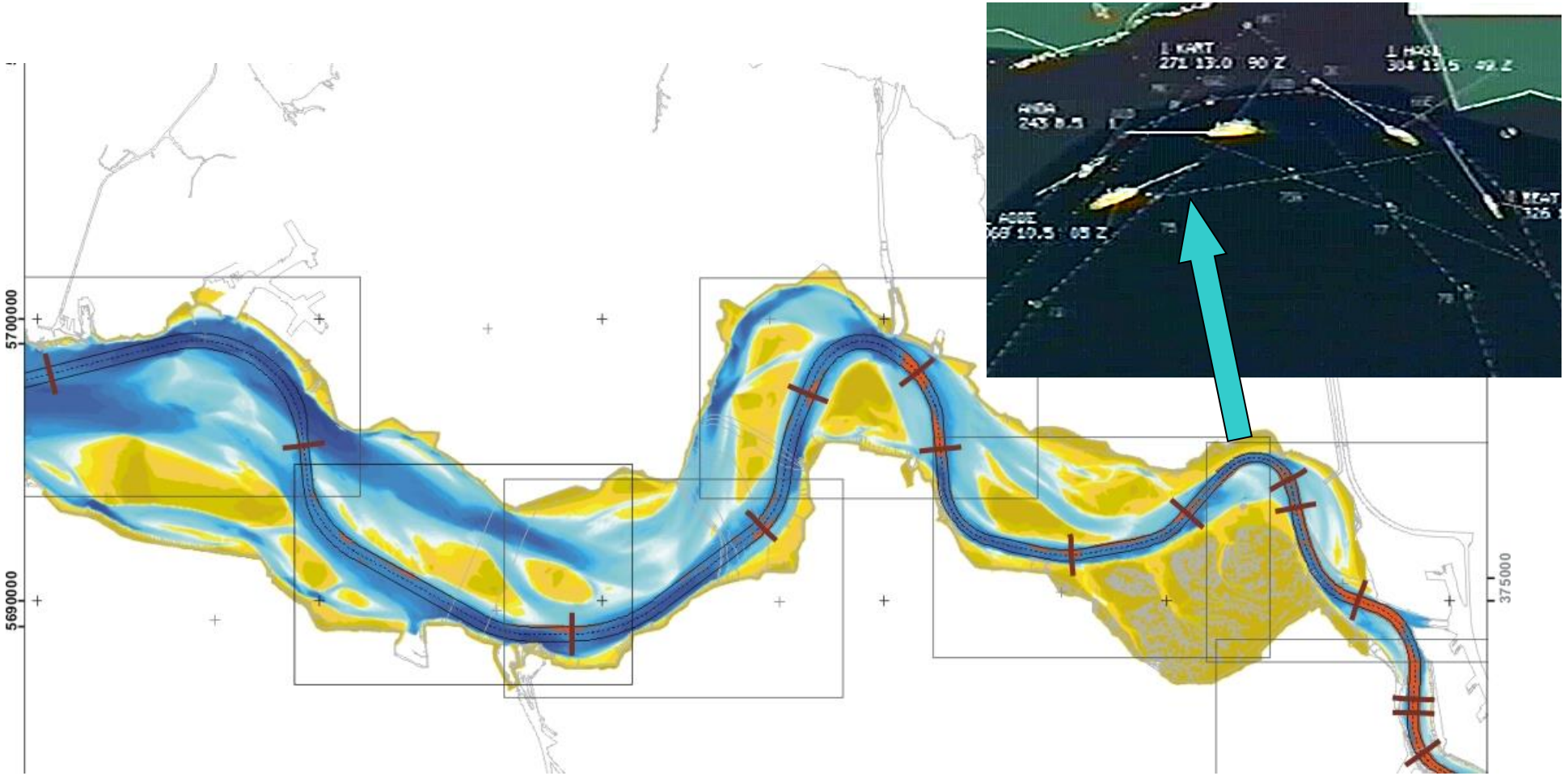
GHENT UNIVERSITY

The Future: Towing Tank II

- **2009:** First initiative
- **2011:** Feasibility study
- **2016:** Decision Flemish Government
- **2017:** Start construction works

- **2019:** Construction works completed
- **2020 – 2021:** Design & build towing carriage
- **2022:** Start (commercial) activities

Ship-bank interaction



Ship-bank interaction

Fairways do not increase at the same rate:

- Deepening of the River Scheldt
- Widening of canals (Suez)
- New locks (Antwerp, Terneuzen, Panama)

Model Tests

Banks

- Rectangular cross section (10)

Model Tests

Banks

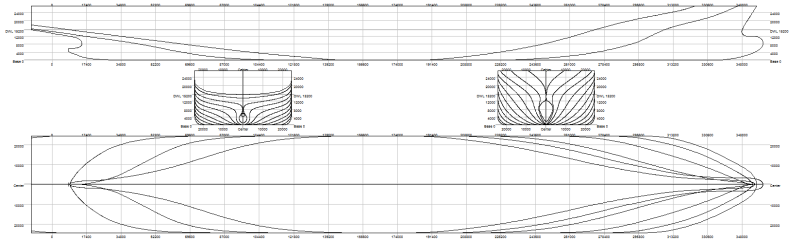
- Rectangular cross section (10)
- Surface piercing banks (7)

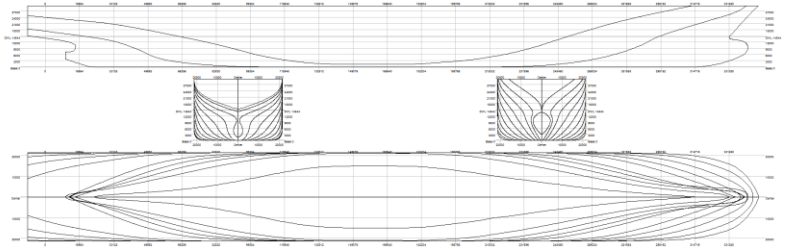


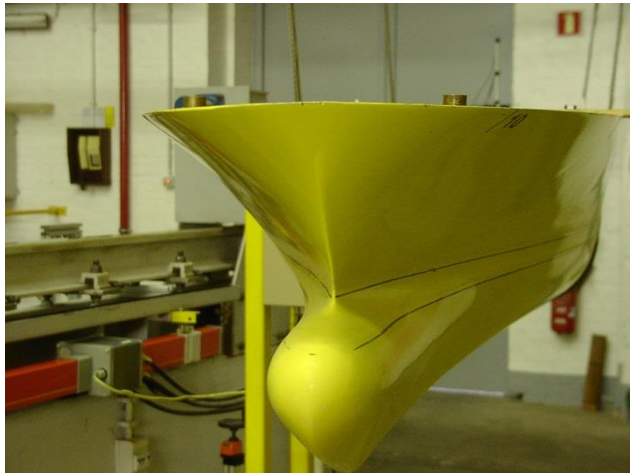

Model Tests

Ship types

- Container carrier (2)



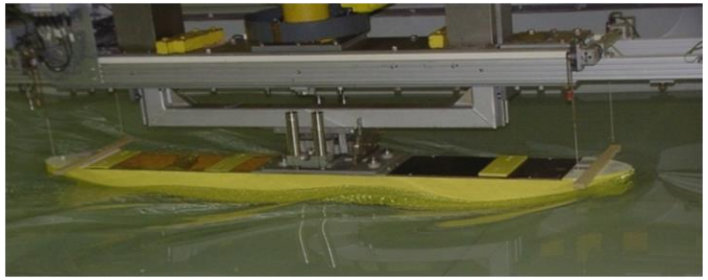


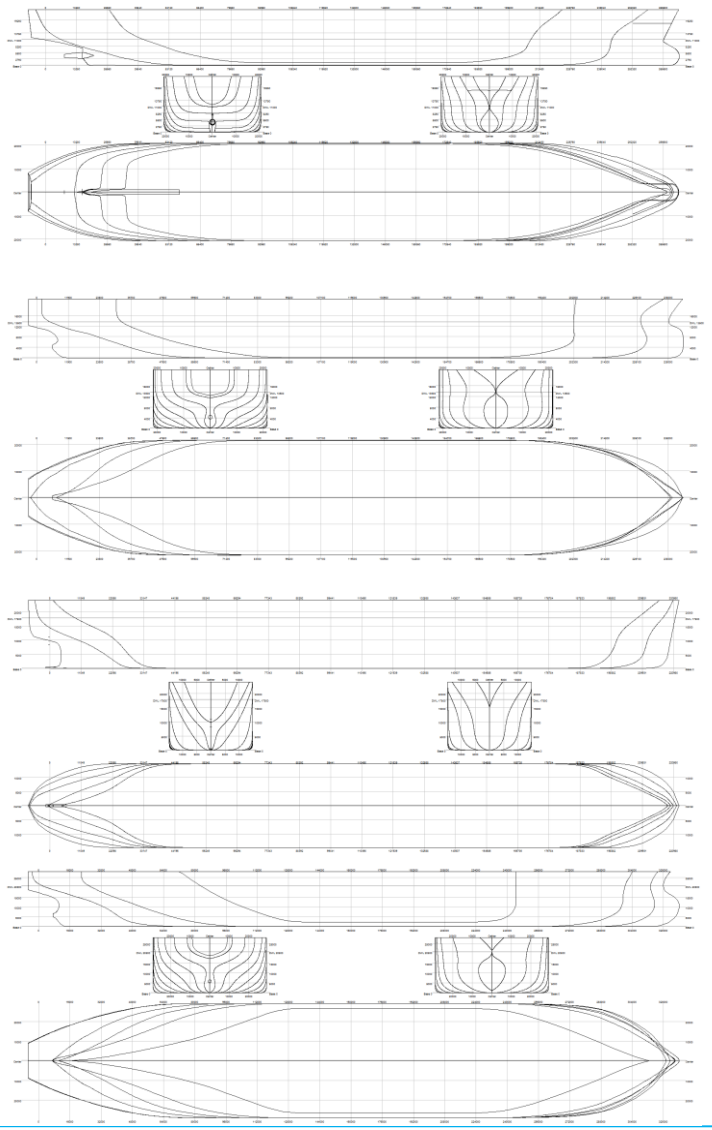


Model Tests

Ship types

- Container carrier (2)
- Tanker (4)

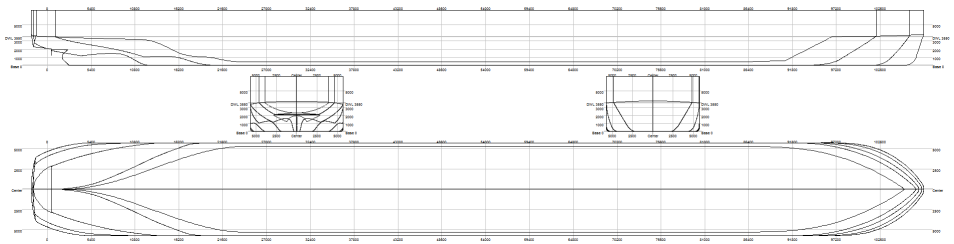


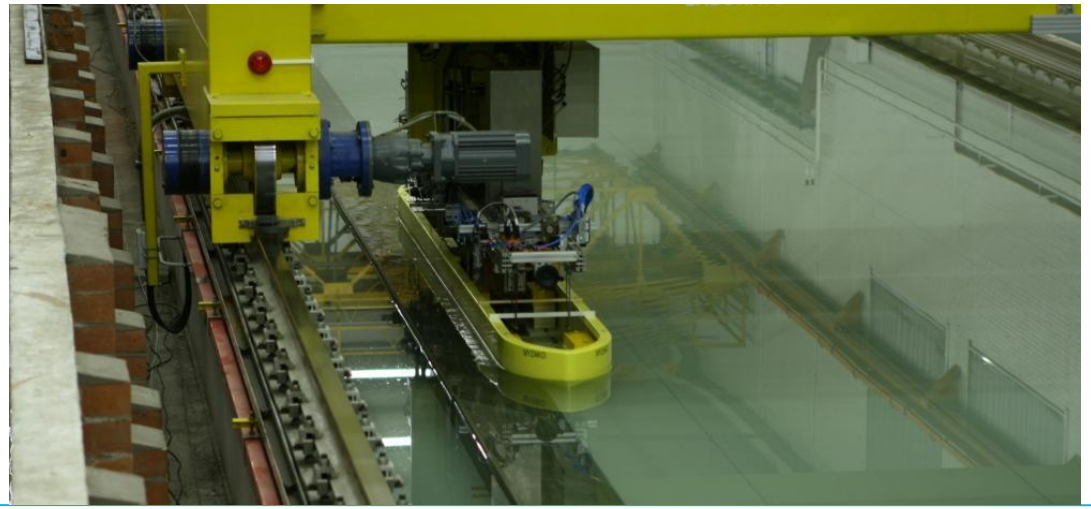


Model Tests

Ship types

- Container carrier (2)
- Tanker (4)
- RoRo (3)
- Inland vessel (1)

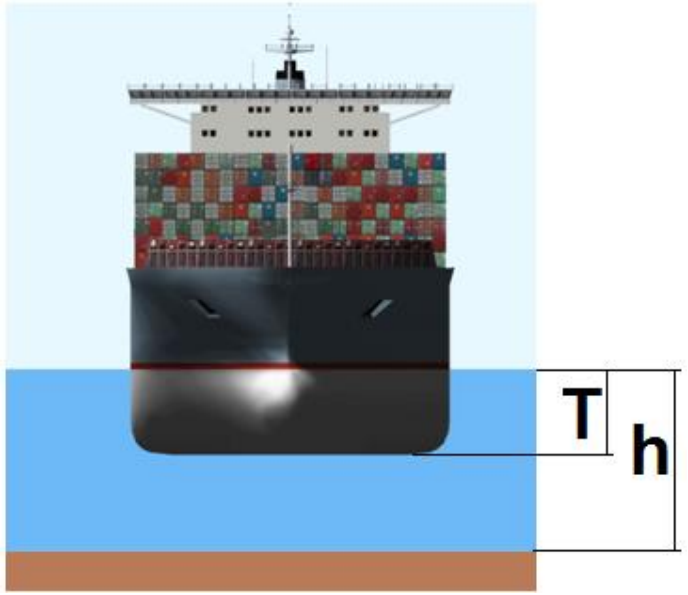


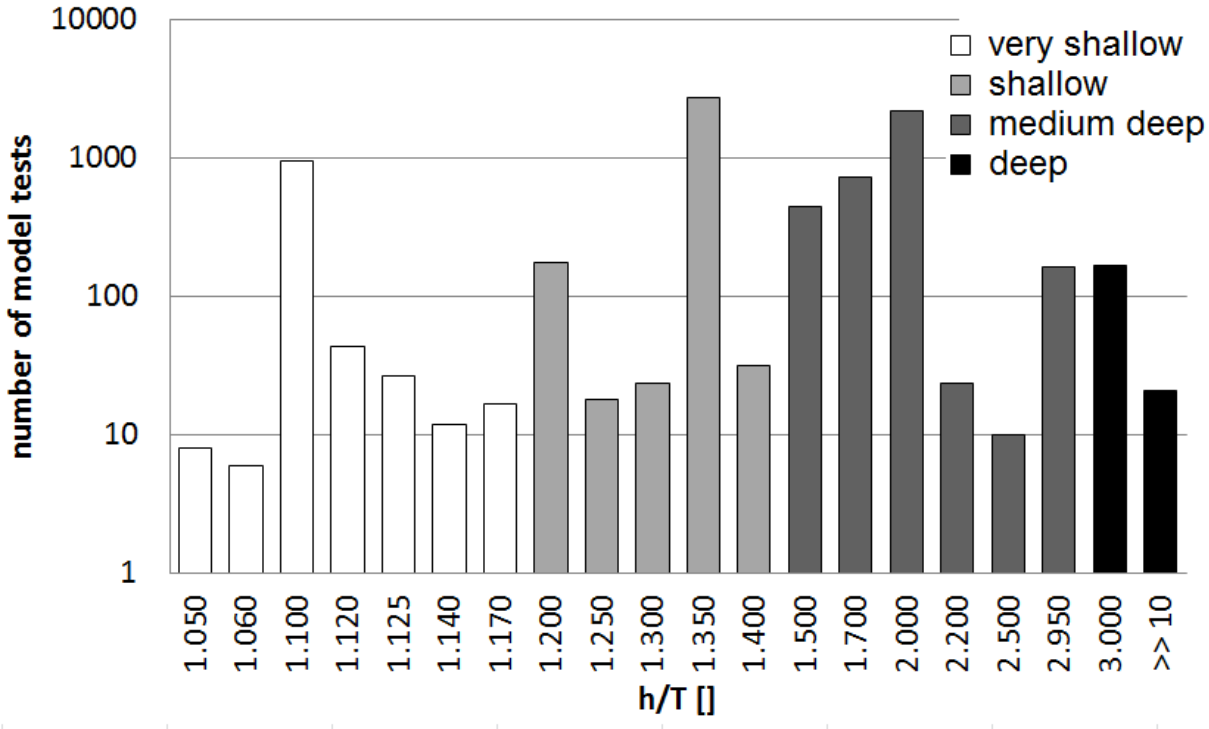


Model Tests

Test program

- Water depth (±3)

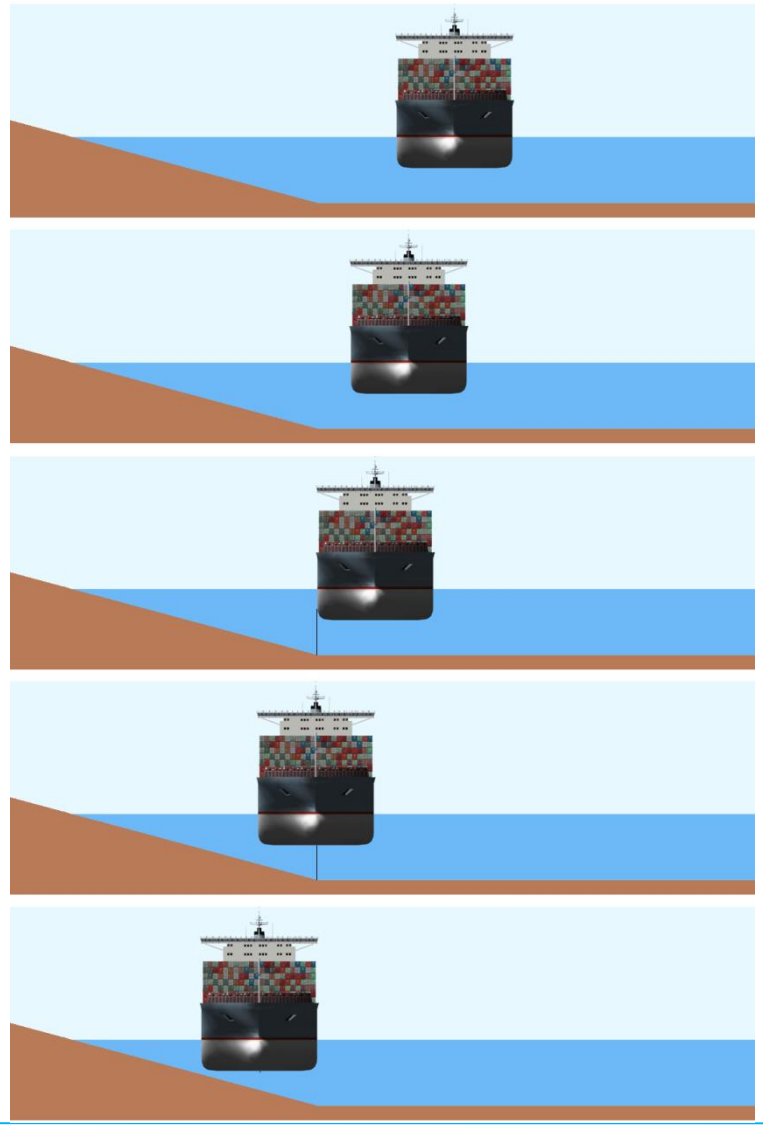




Model Tests

Test program

- Water depth (±3)
- Lateral position (±5)



Model Tests

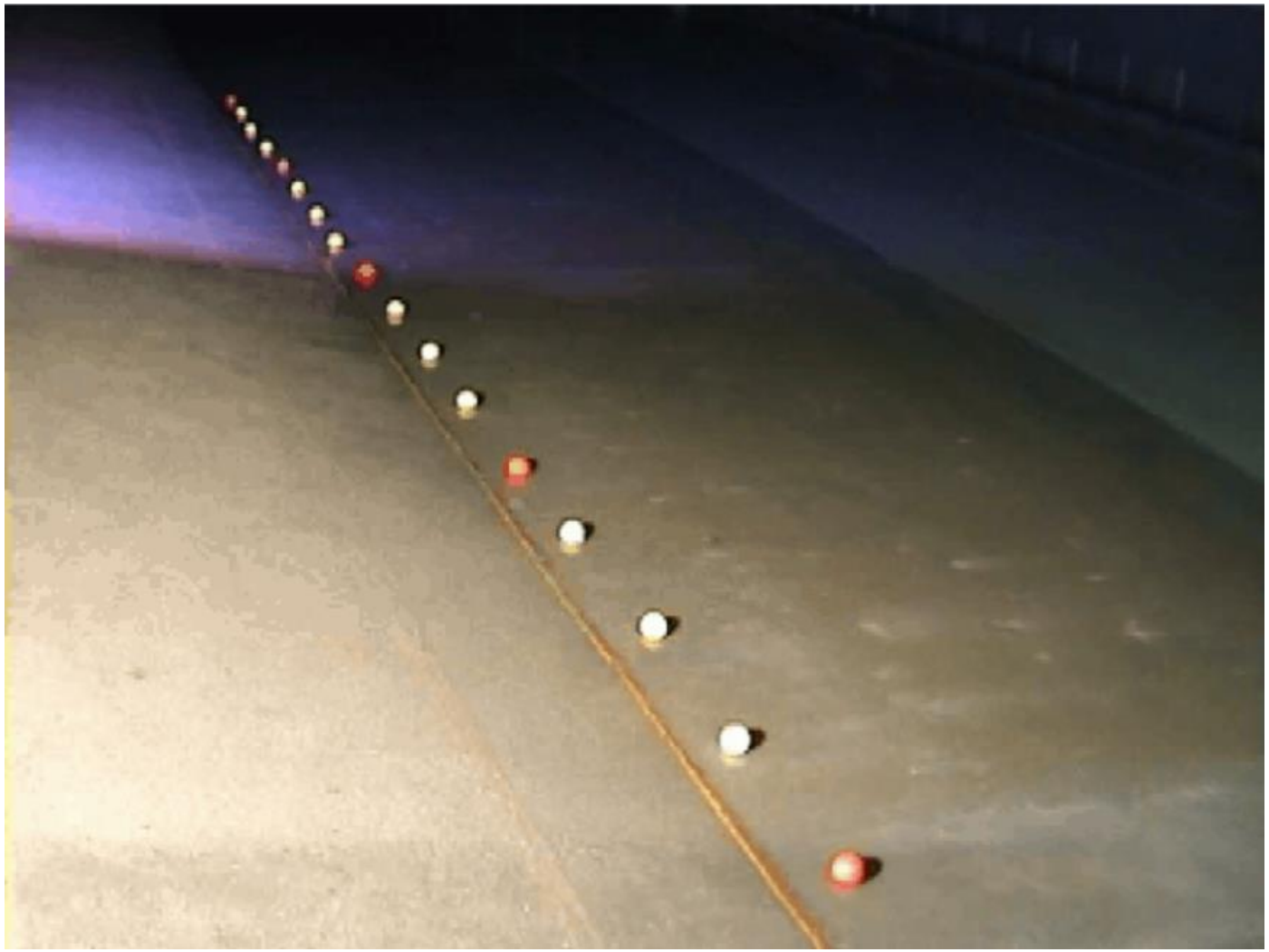
Test program

- **Water depth h (±3)**
- **Lateral position (±5)**
- **Velocity (±4)**
- **Propeller action (±3)**

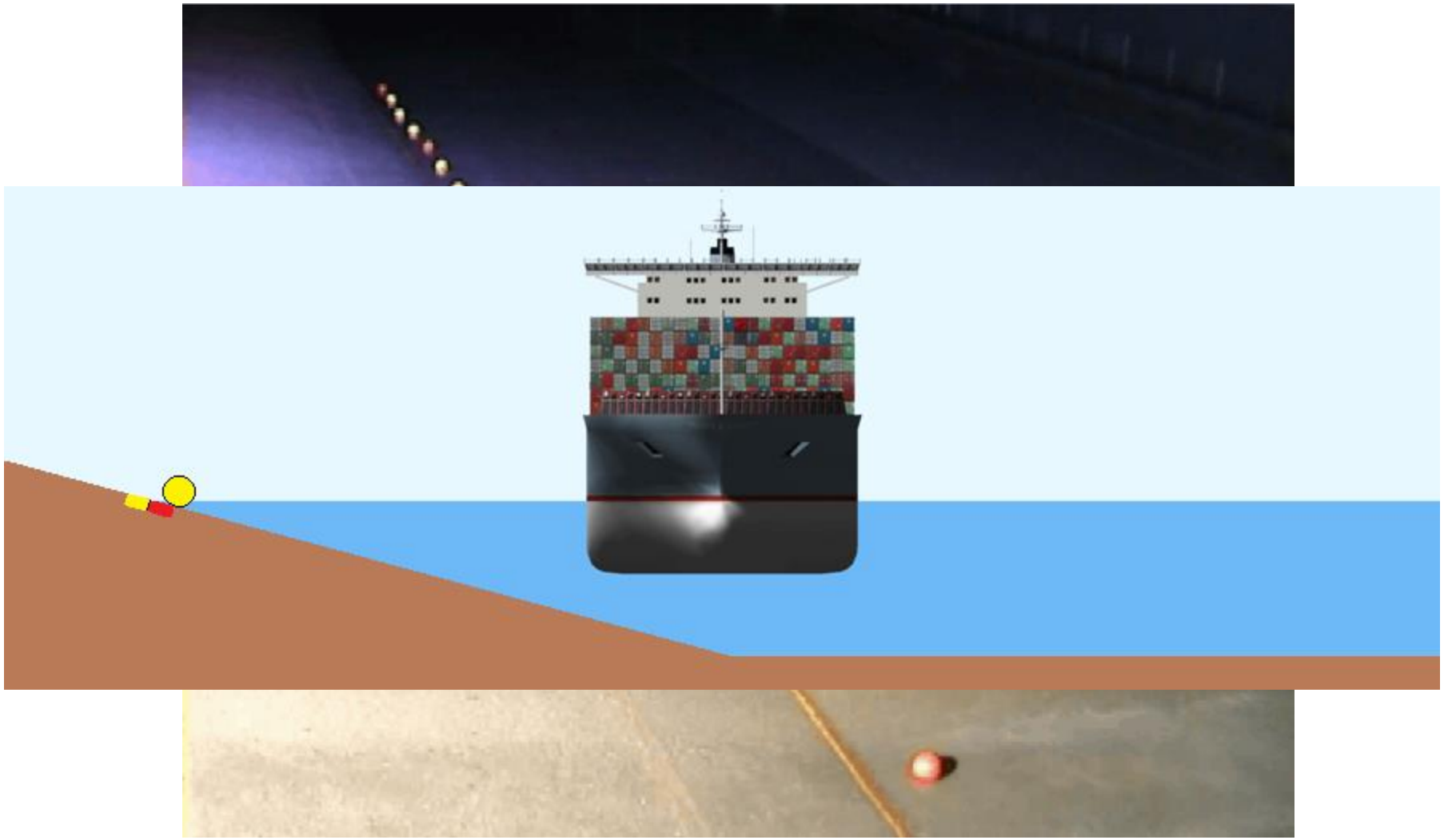
3x5x4x3 = 180 model tests per ship - bank combination

+10.000 different model tests

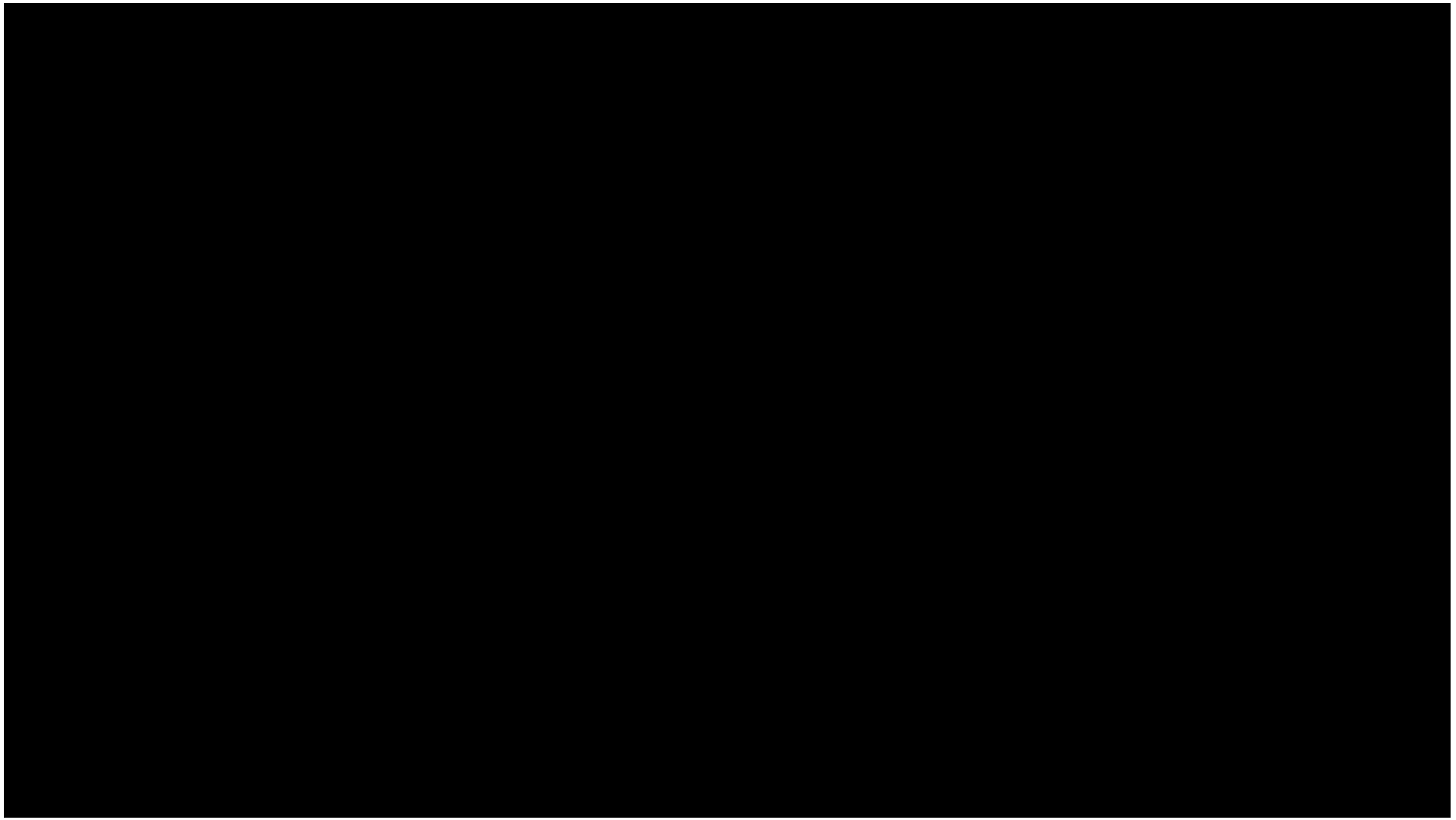
Bank Effects



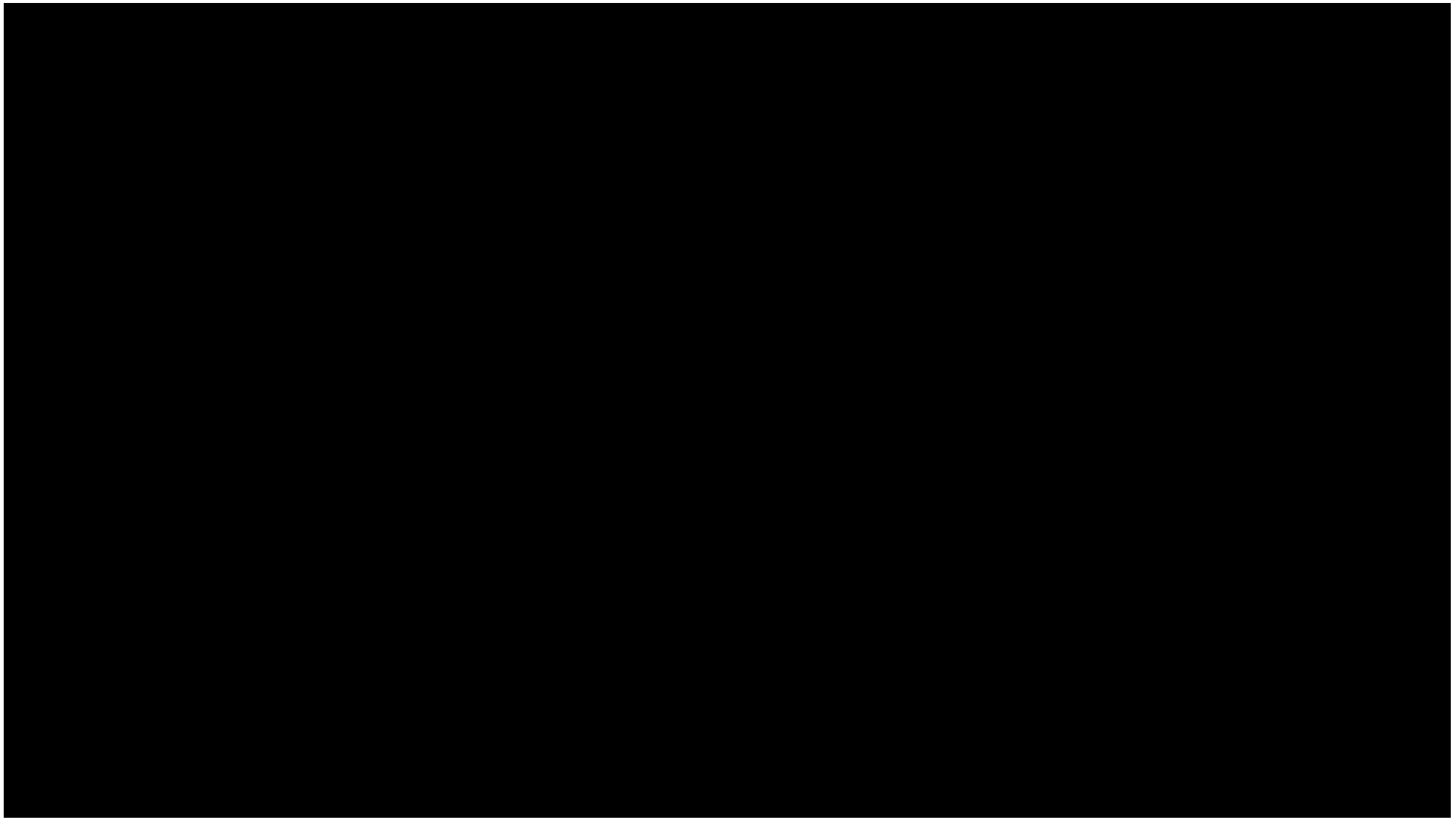
Bank Effects



Bank Effects



https://youtu.be/MO-yuRW9qBc

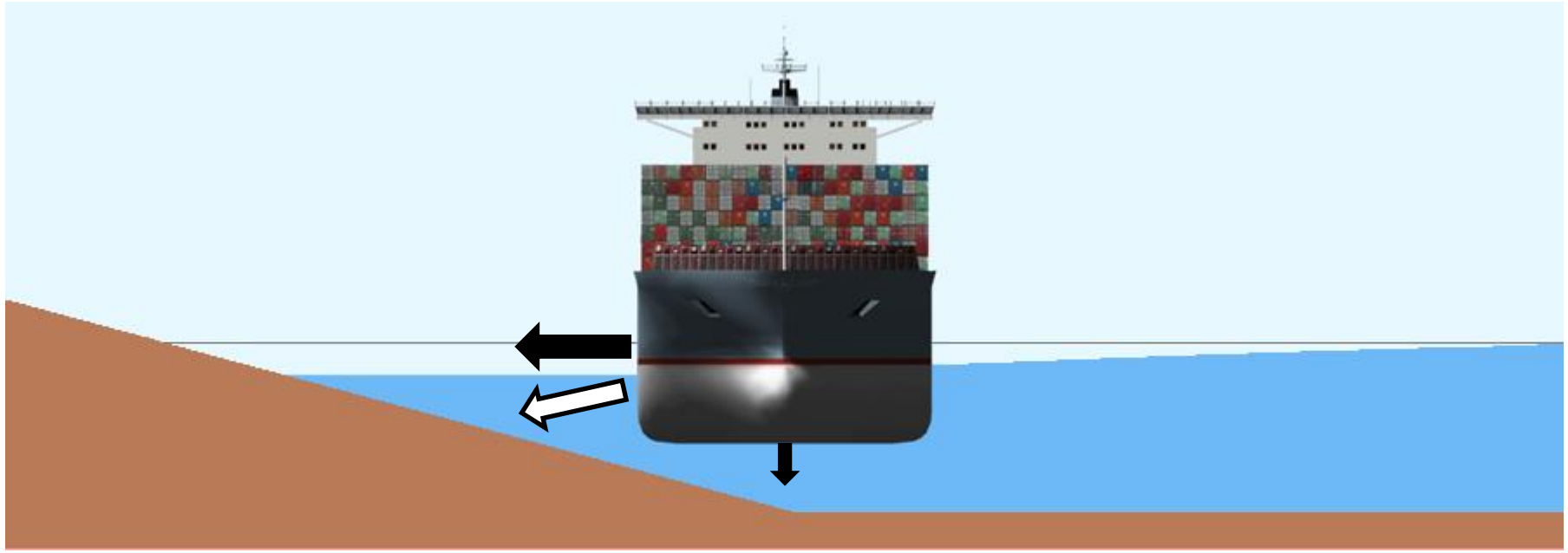


GHENT UNIVERSITY

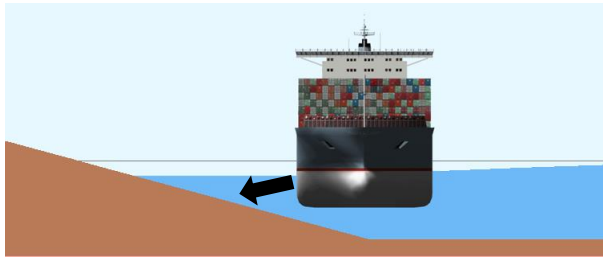
MARITIME TECHNOLOGY
GHENT UNIVERSITY

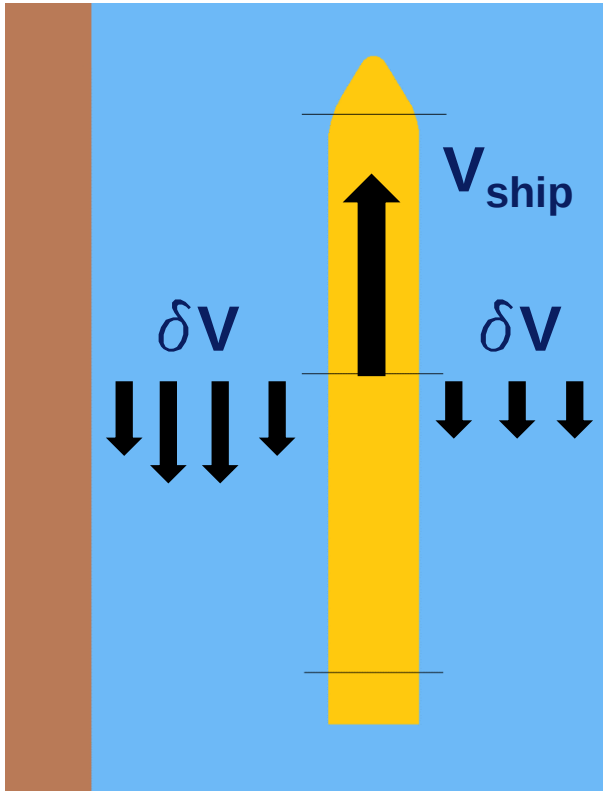
https://youtu.be/wTV99tWkhFc

Bank Effects

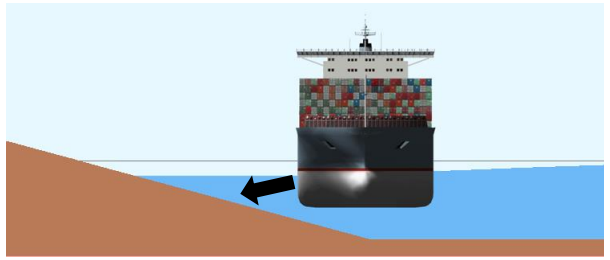


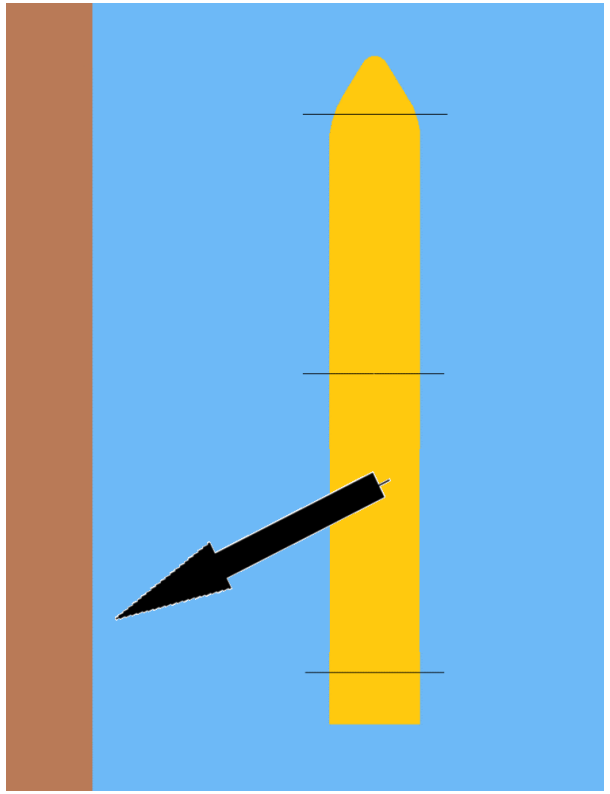
Bank Effects



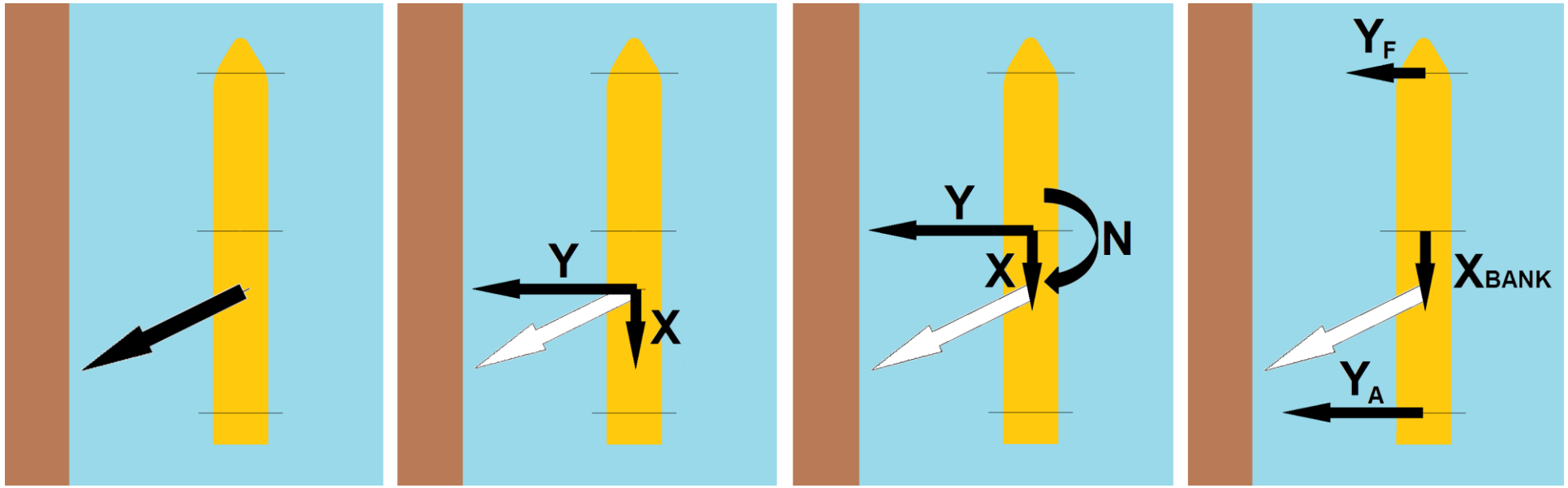


Bank Effects

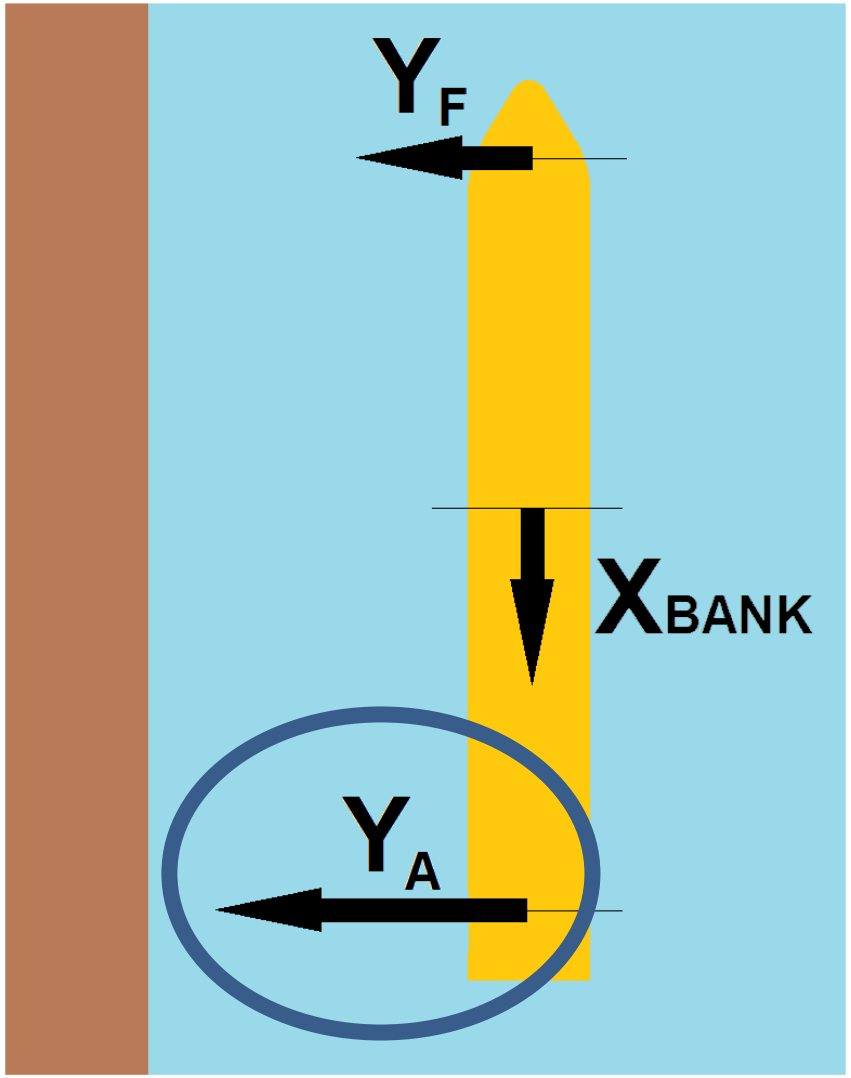




Bank Effects



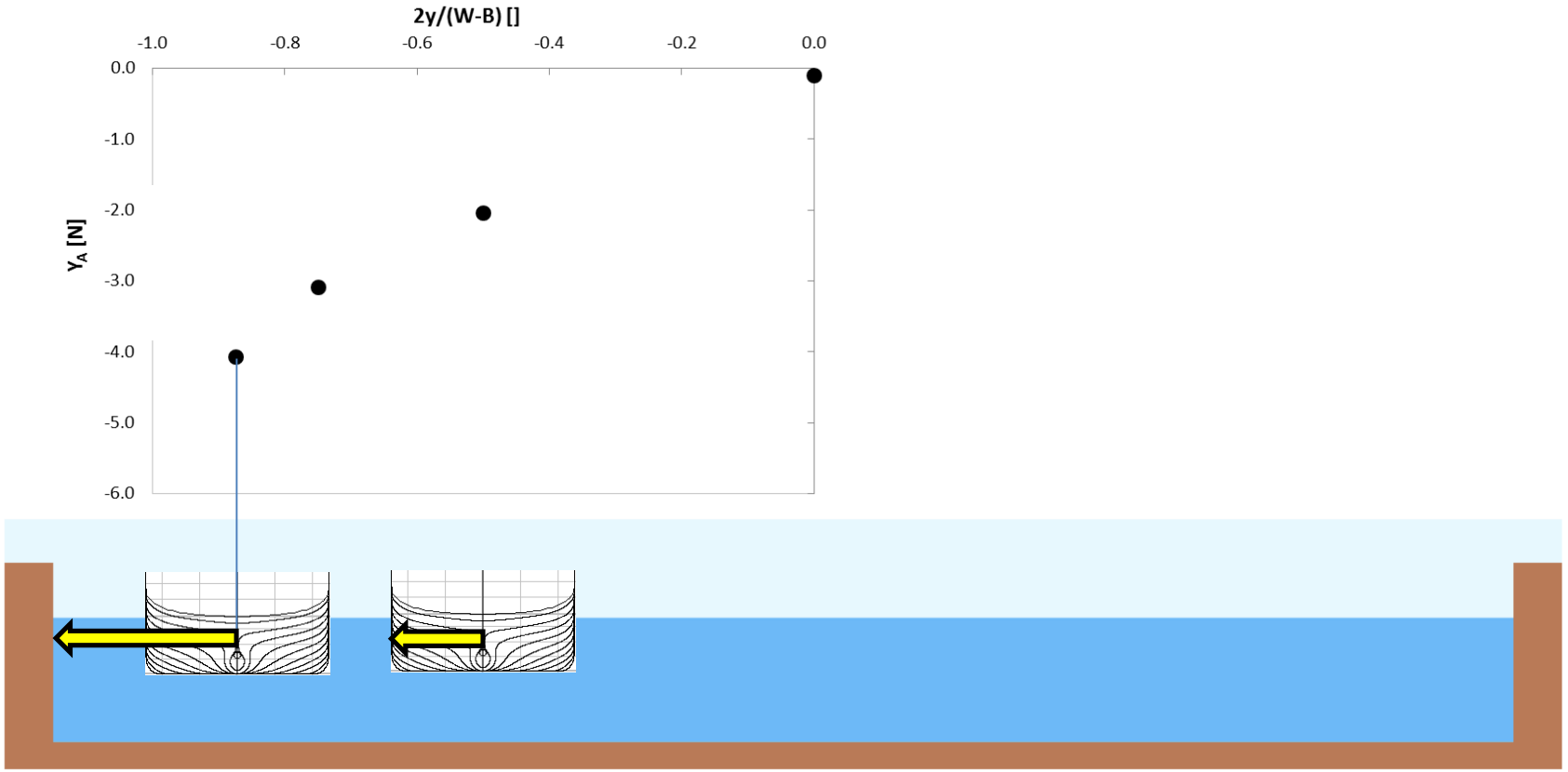
Lateral Force at the Aft Y_A



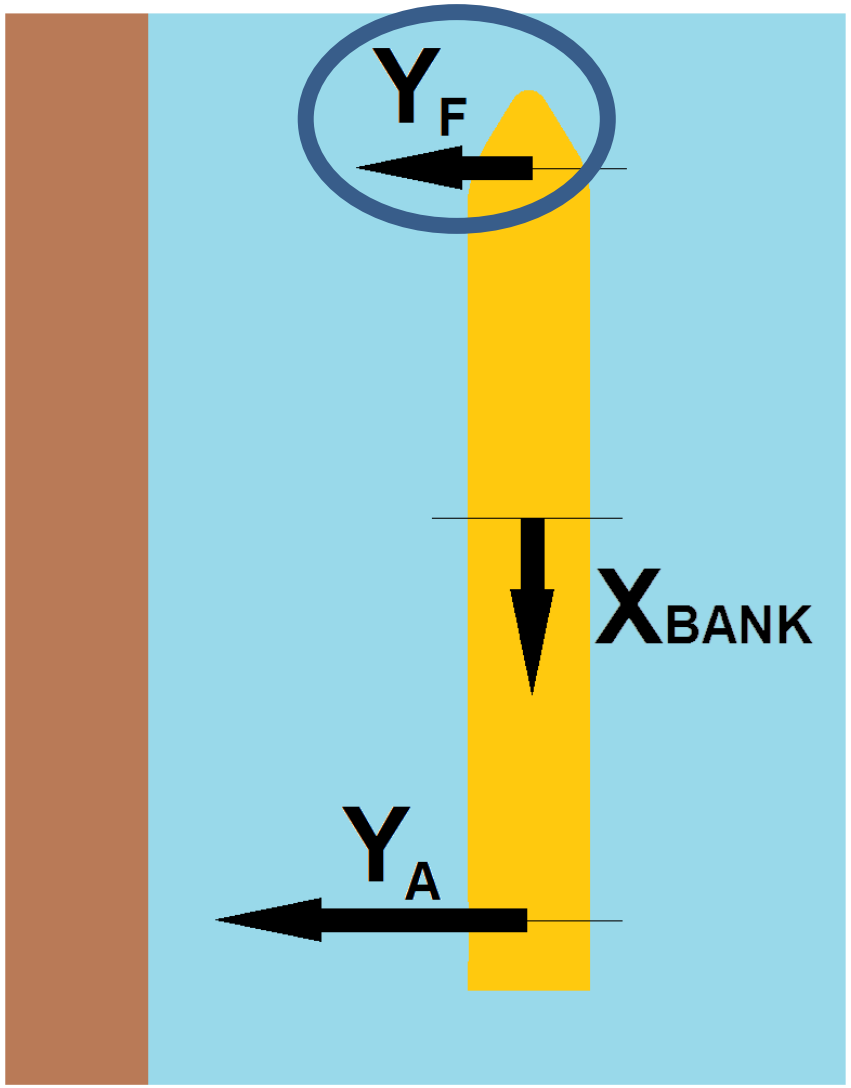
Lateral Force at the Aft Y_A

Observations

Lateral position y



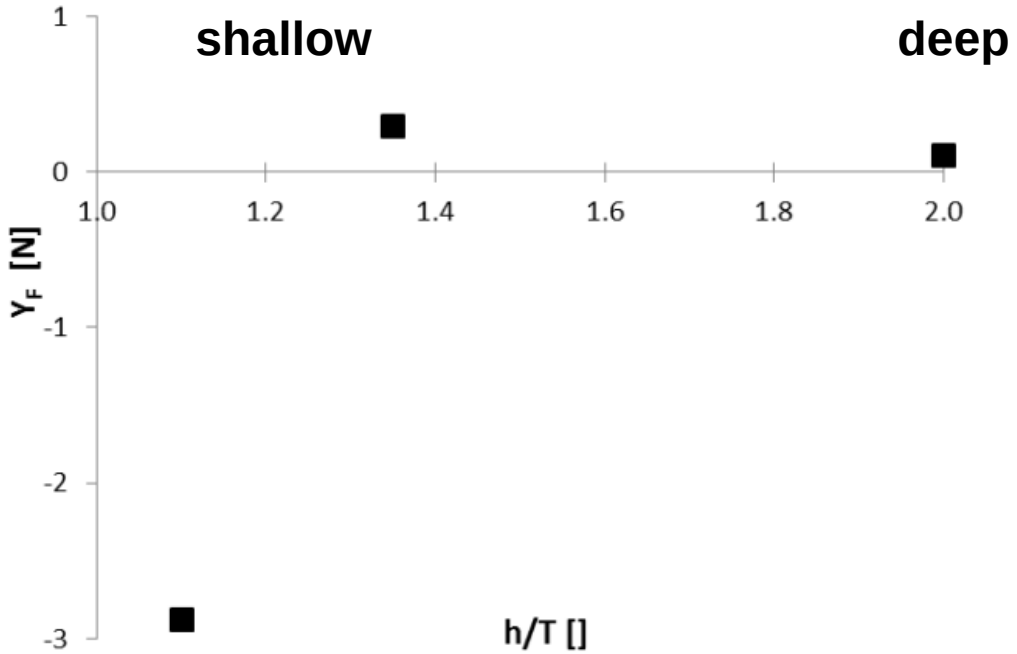
Lateral Force at the Fore Y_F

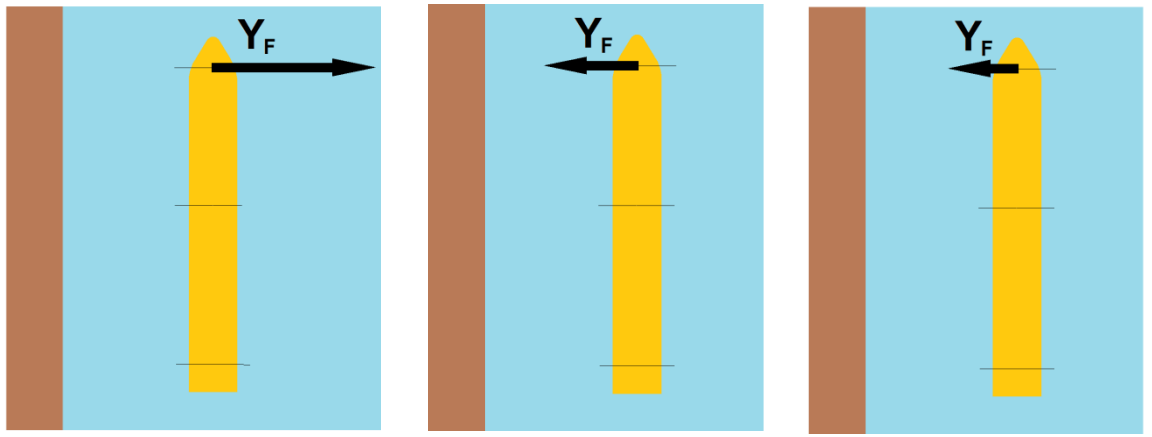


Lateral Force at the Fore Y_F

Observations

- Water depth



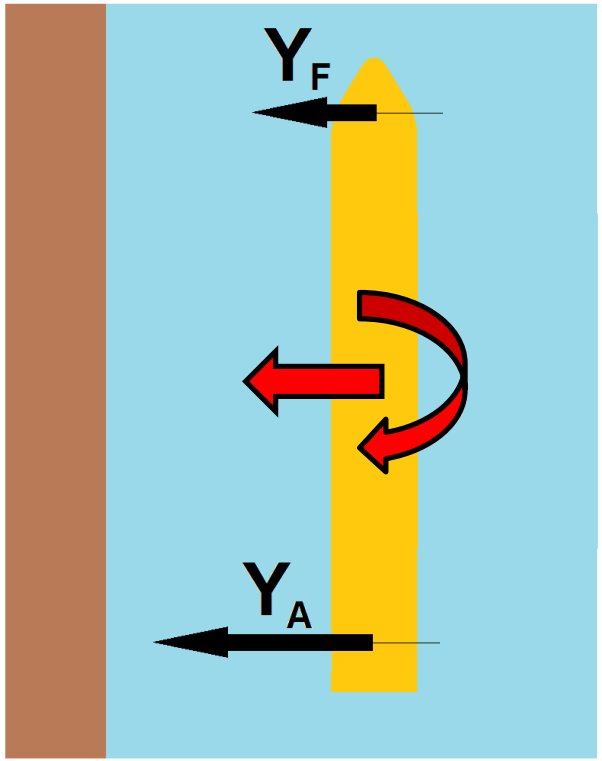


Conclusion

Deep

-attraction

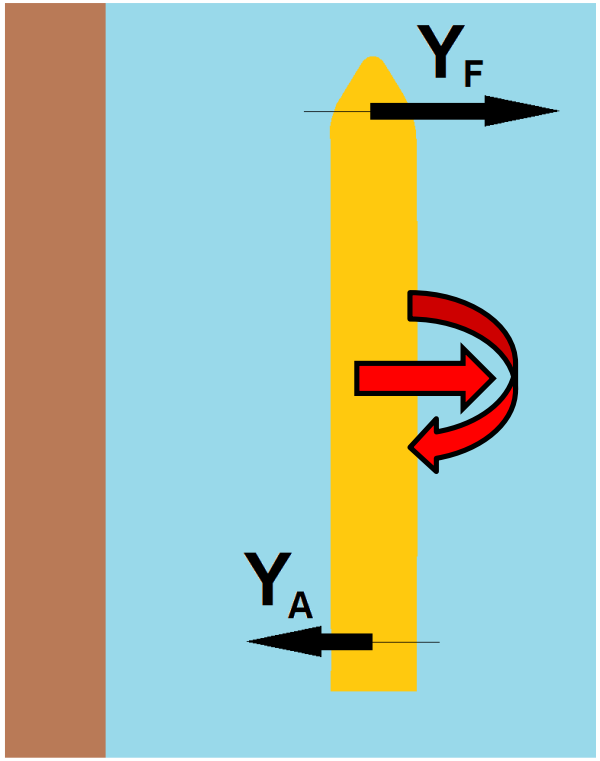
-bow away



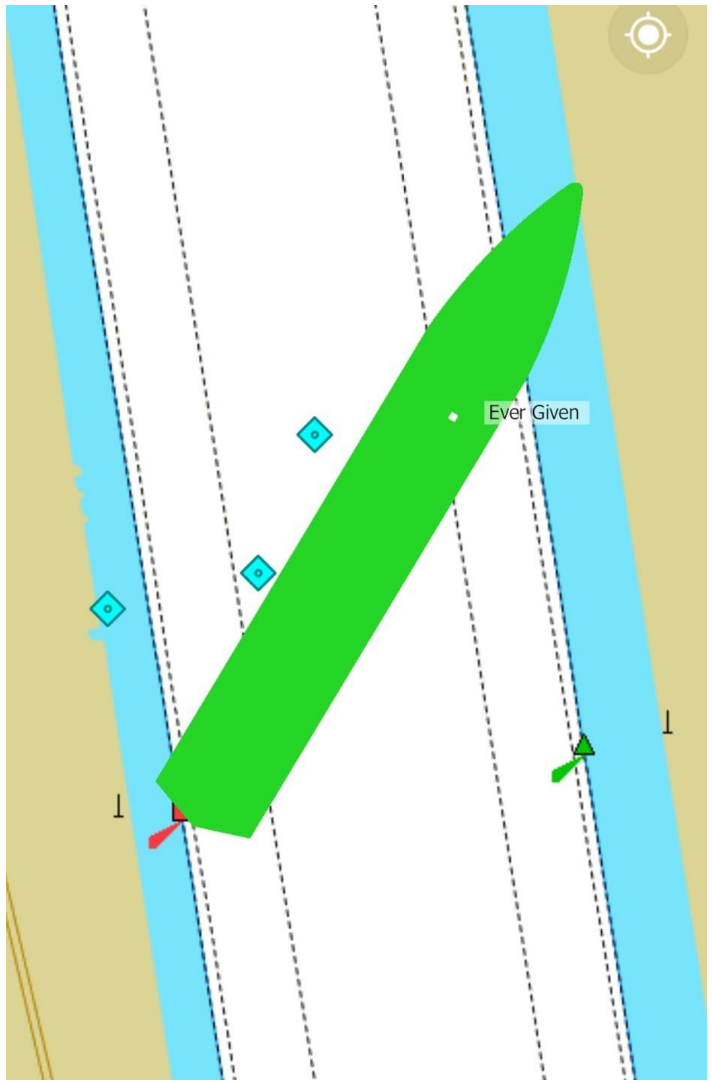
Shallow

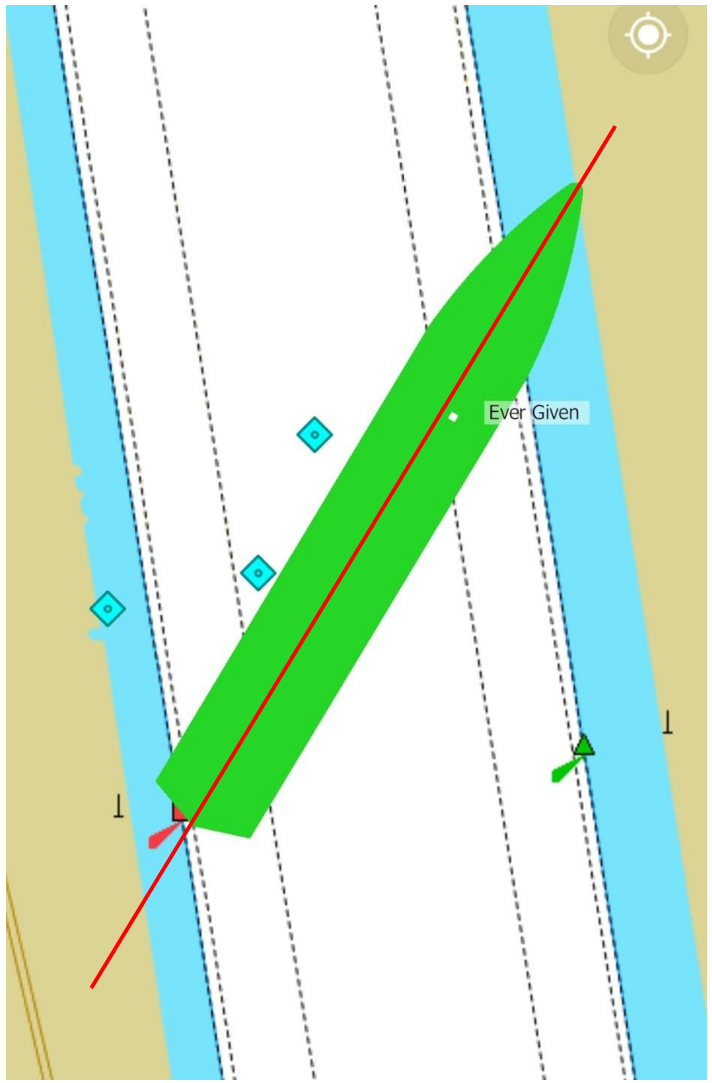
-repulsion

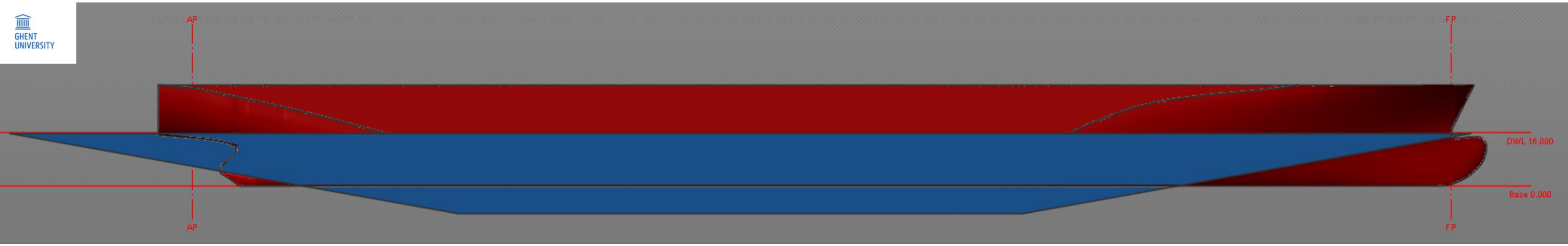
-bow away

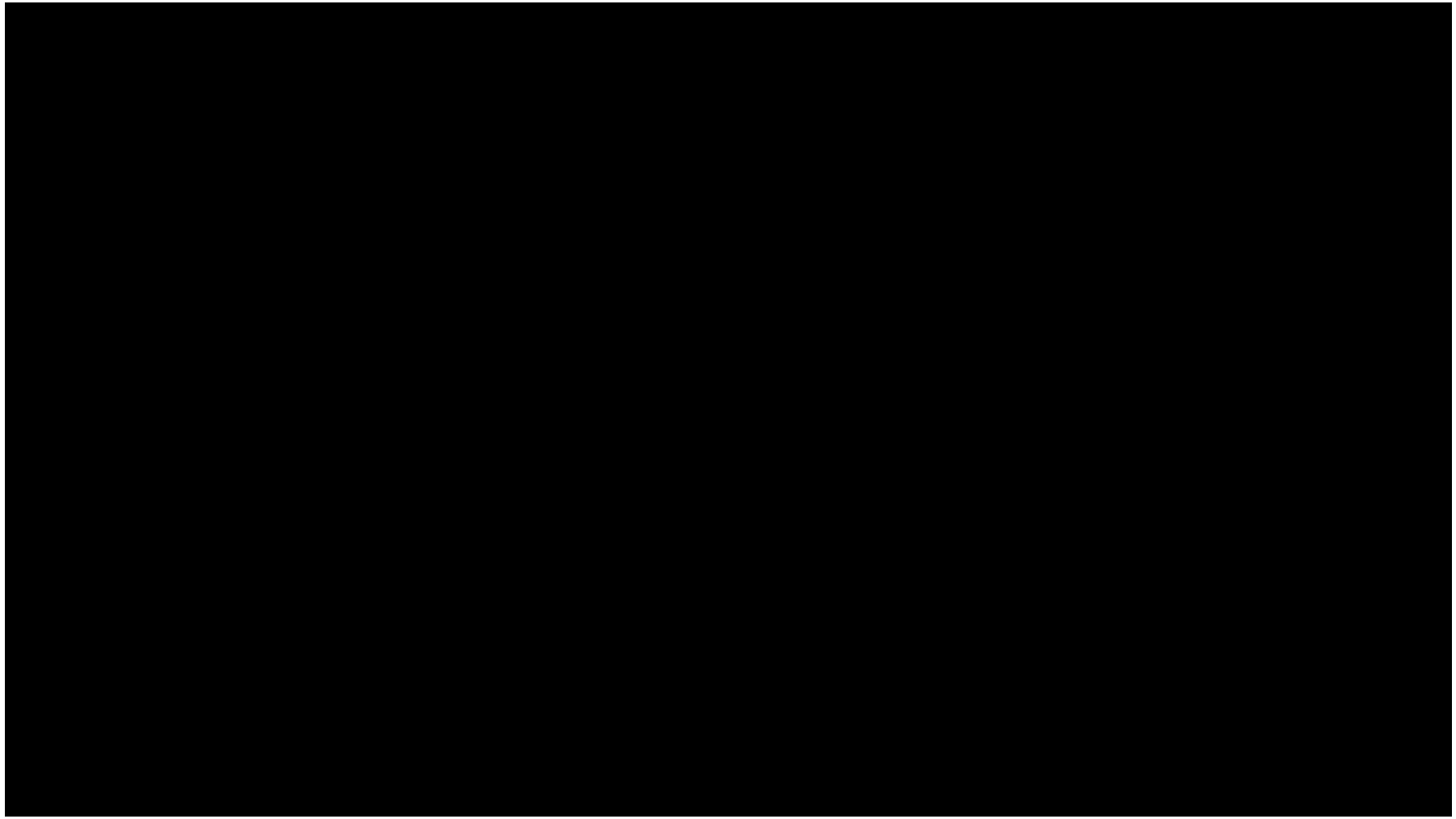



EVERGREEN

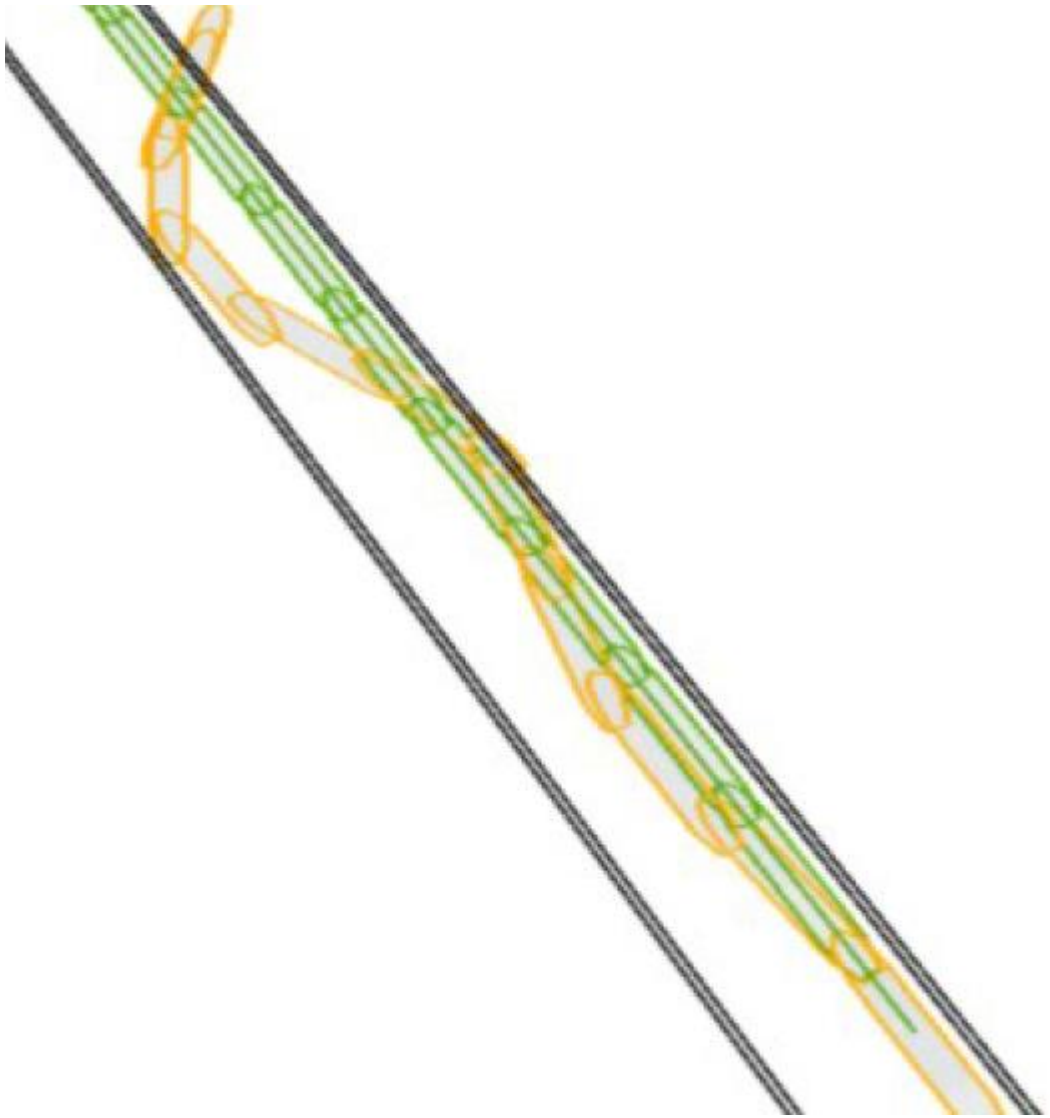

Ever Given


Ever Given


AP
FP
DWL 16.000
Base 0.000
AP
FP



https://youtu.be/tGXTrcQ5wm8



FACULTY OF ENGINEERING AND ARCHITECTURE

Evert Lataire

Evert.Lataire@UGent.be

www.shallowwater.be
www.maritime.ugent.be

https://www.youtube.com/channel/UCPG6uH2J79NCaGveESwGnjA