FACULTY OF ENGINEERING AND ARCHITECTURE

MARITIME TECHNOLOGY GHENT UNIVERSITY

MARITIME TECHNOLOGY DIVISION

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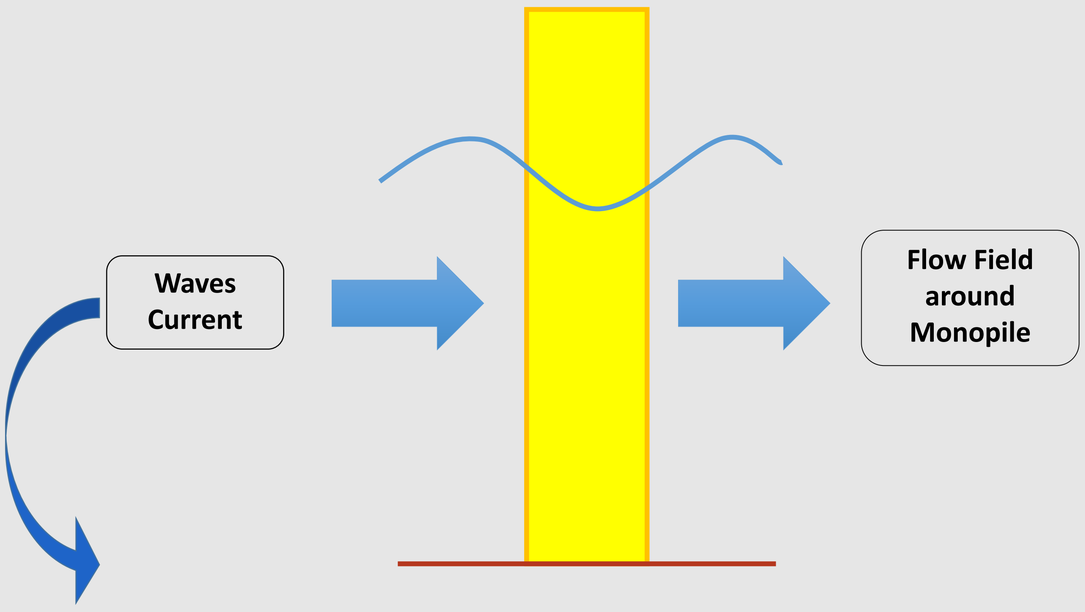
WHAT IS THE EFFECT OF CURRENTS, SUPERIMPOSED ON WAVES?

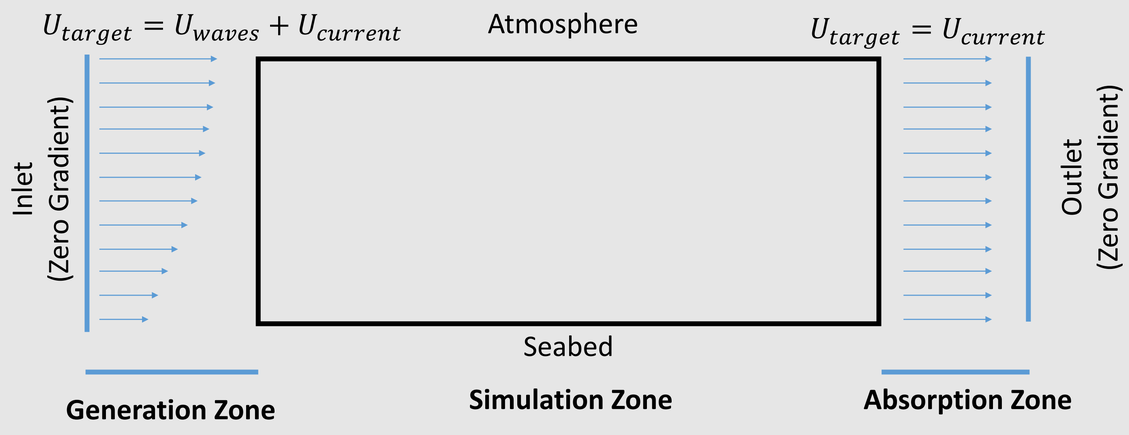
PRELIMINARY STUDY FOR WAVE-CURRENT-MONOPILE SIMULATIONS OF BELGIAN OFFSHORE WIND TURBINES

Background

- Understanding wave-current effect on Belgian Offshore Operations
- Operation's safety is related to flow field around the wind turbine
- Investigation of wave-current interaction in the numerical simulation

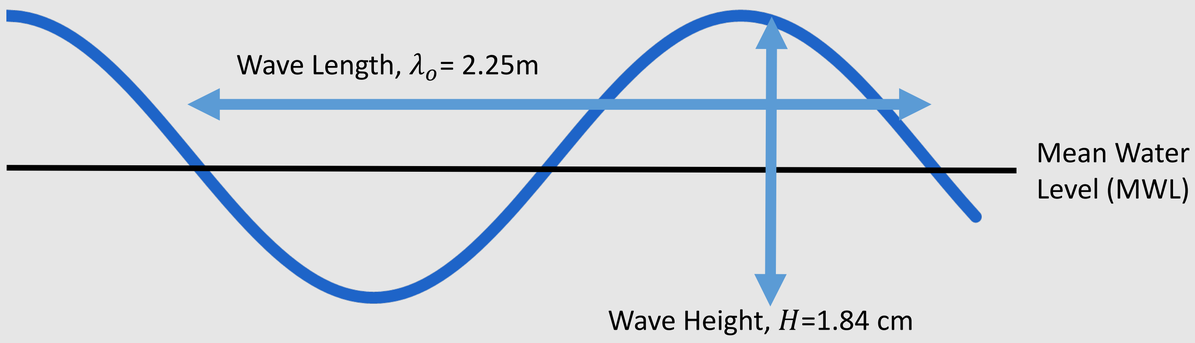


Wave-Current Superposition



- *Modified-Waves2Foam*: current velocity is superimposed on the wave velocity
- In opposing current, theoretically: wave height gets higher, wave length gets shorter

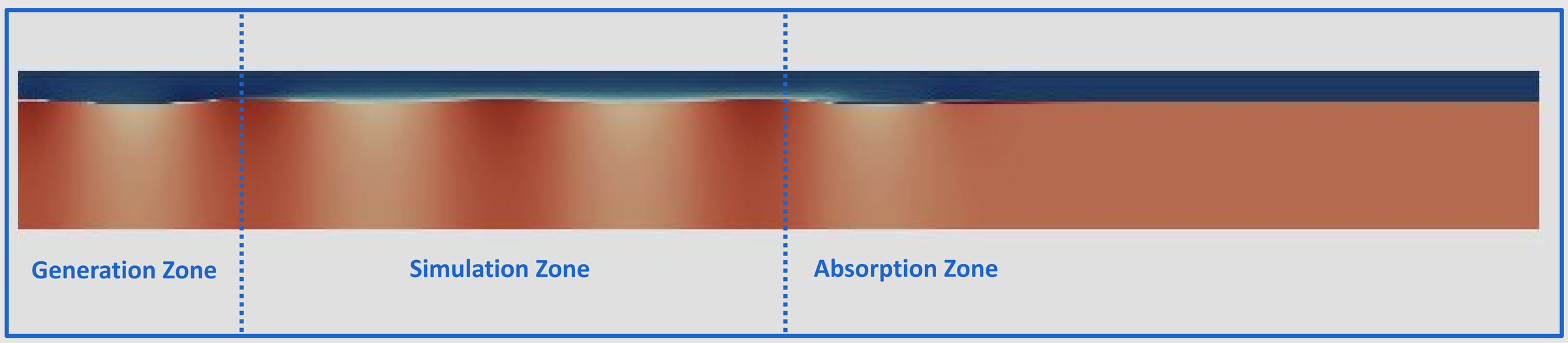
REGULAR WAVE PROPERTIES



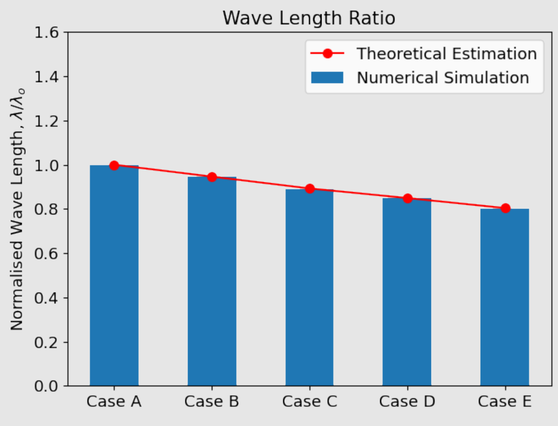
- Wave period, T is time needed for the waves to travel one wave length distance. T = 1.25s
- Water depth, h is distance from MWL to seabed. h = 0.57 m

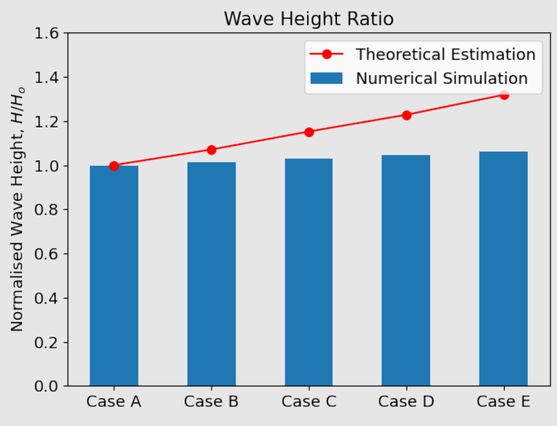
Study Case:	Case A	Case B	Case C	Case D	Case E
Opposing Current Speed, U (cm/s)	0.00	5.97	11.62	15.98	20.30

WAVE-CURRENT NUMERICAL FLUME



RESULTS AND DISCUSSION





- Wave-current interaction is occurring in the simulation zone
- Wave length becomes shorter in increasing opposing current
- Wave height becomes higher in increasing opposing current

Future Work

Numerical simulation of wave height ratio does not fit theoretical estimation. Numerical problem or new theory is required?

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