Chapter 16: Flow developments in closure gaps

ct5308 Breakwaters and Closure Dams

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Closing a river channel

- Example connection between Rhine and Meuse
- In case of a level difference of 2 m over 13 km applying Chezy will lead to u = 0.80 m/s

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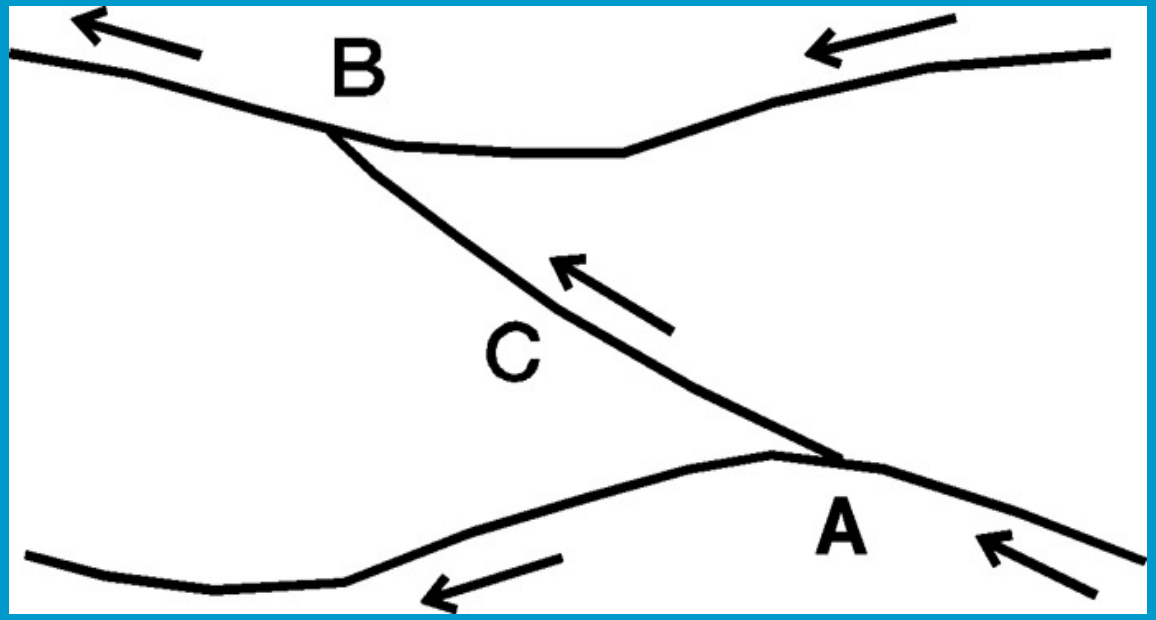
channel view



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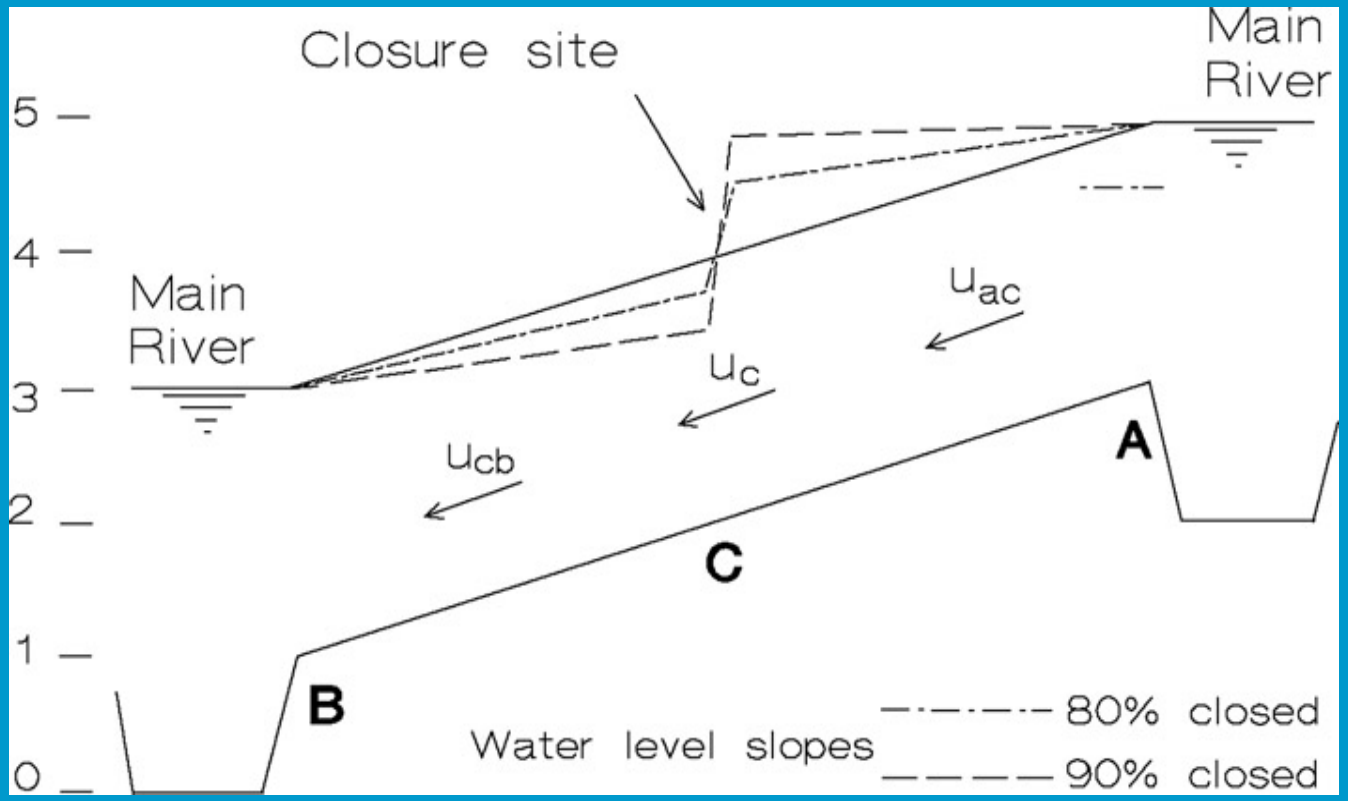
closing a river channel



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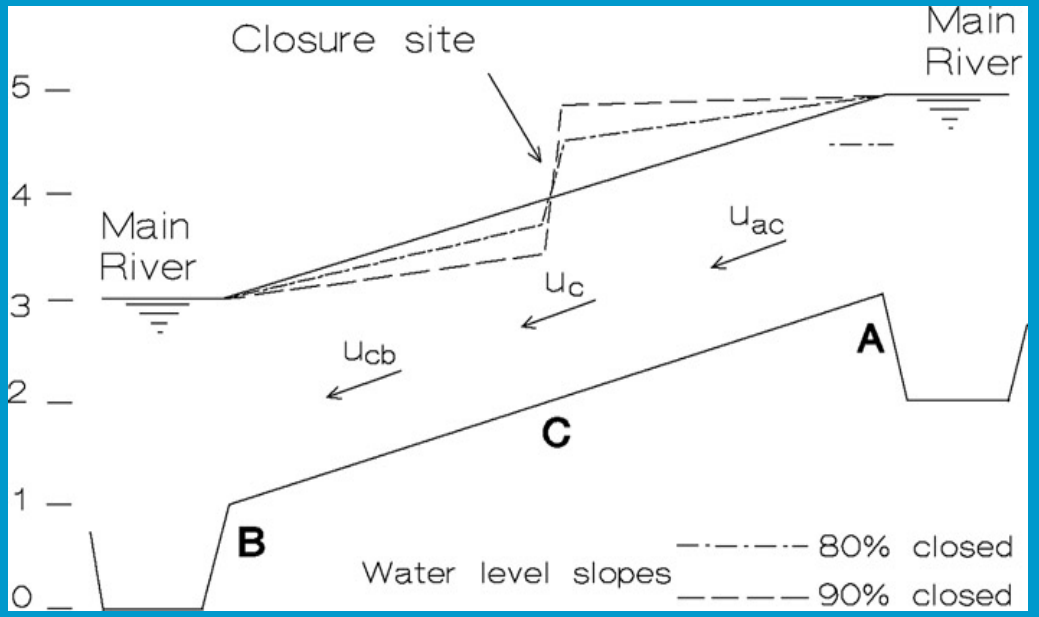
effect of closure

Using Chezy and Backwater-curve calculations:



90 % blockage gives:

0.40 m/s in AC

0.55 m/s in BC

4.50 m/s in the gap

nearly 100% blockage gives head difference of 2 m

velocity becomes 6 m/s

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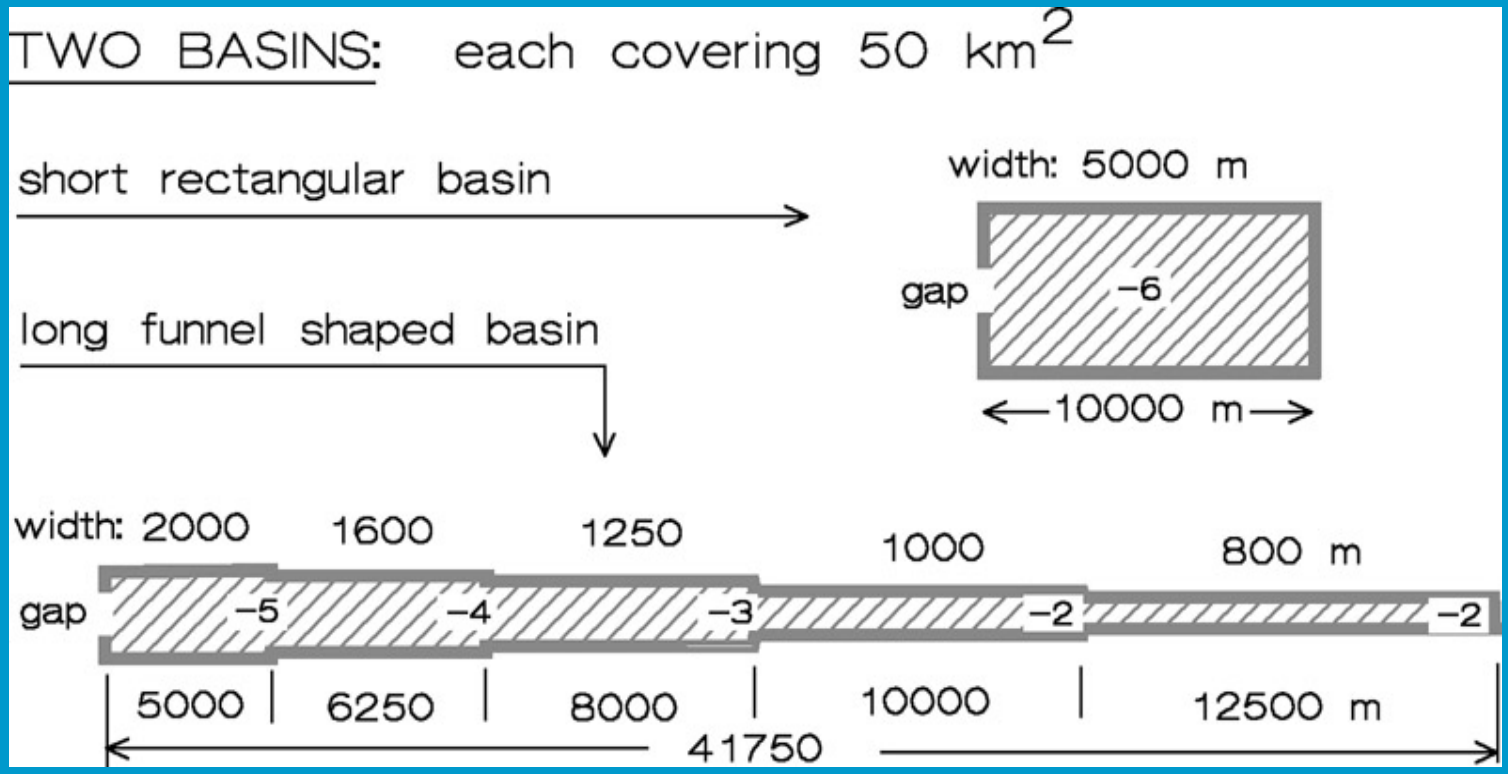
two basins on which the calculations are based



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four cases calculated

- horizontal closure of a short basin
- horizontal closure of a long basin
- vertical closure of a short basin
- vertical closure of a long basin

- stepwise reduction of the gap in 5 steps (100%, 50%, 25%, 10% and 3%)

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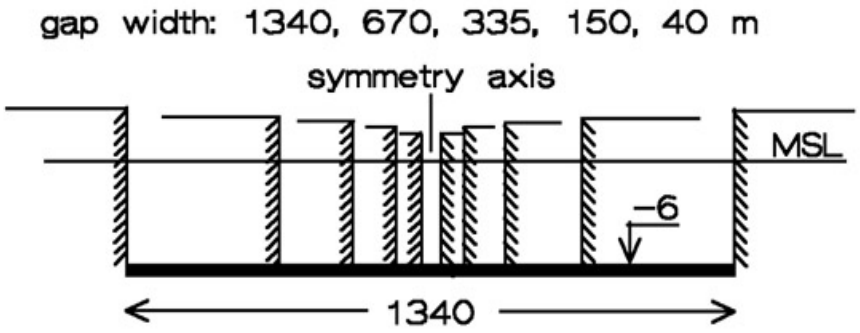
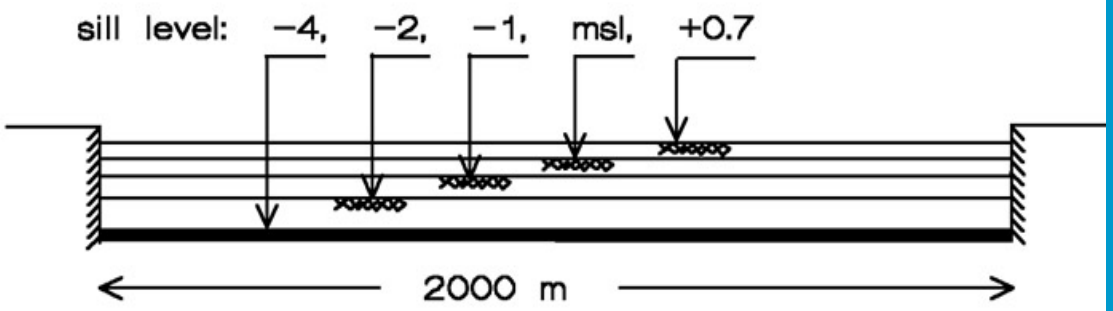
closure gap dimensions and stages

5 closing stages



horizontal closure



vertical closure

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identical points

- all discharge coefficients are 1
- all elements of the dam are impermeable
- tide is simple (sinus with constant amplitude of 1.5 m)
- C = 50
- Duflow is used for all computation
  (for info about Duflow see : www.duflow.nl)

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output presented in the graphs

- water level just outside the the basin near the gap
- water level just inside the basin near the gap
- water level at the end of the basin
- flow velocity in the gap

Note: for short basin water level in the whole basin is identical

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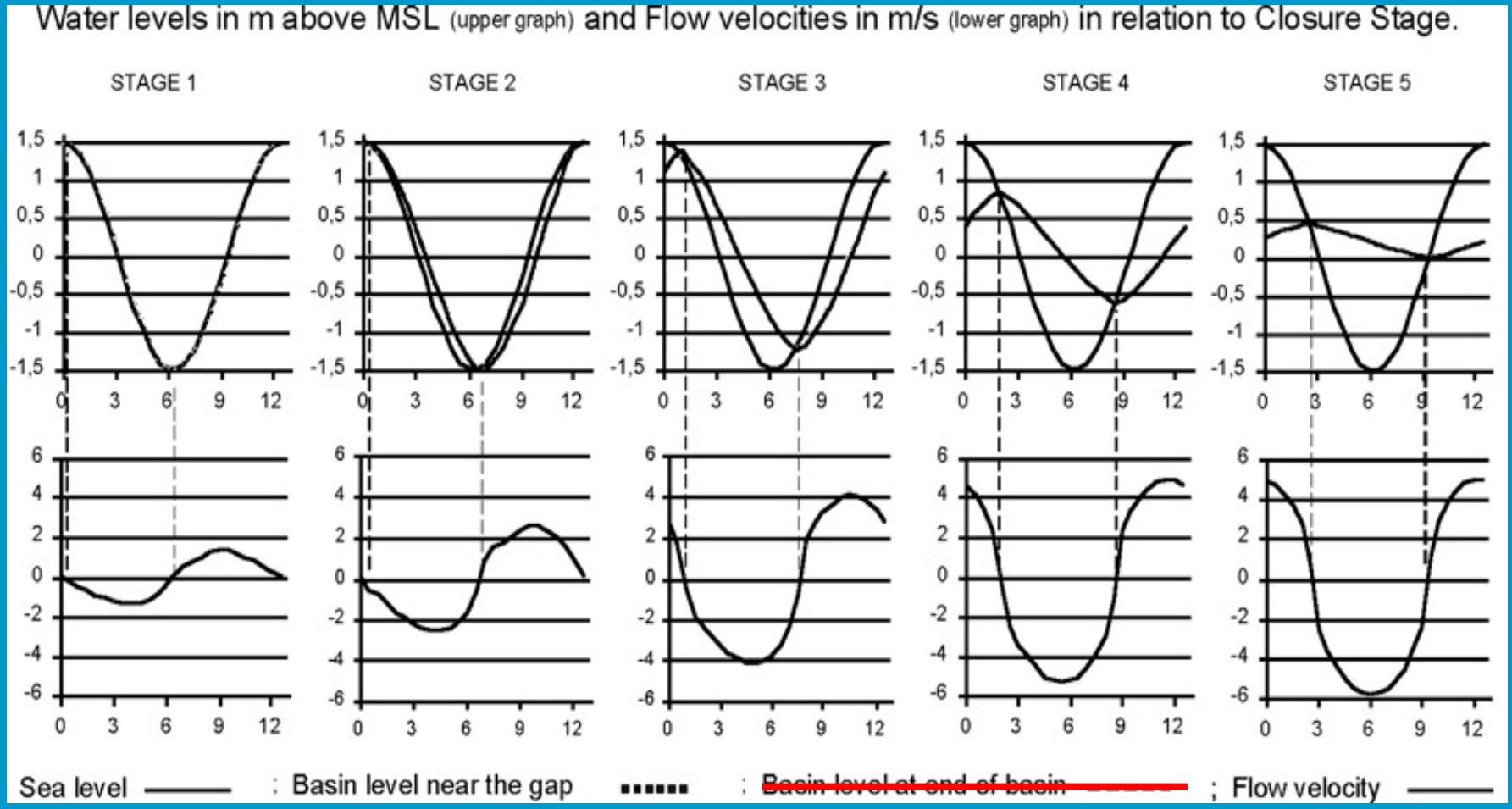
horizontal closure, short basin (16.5)



note printing error in book

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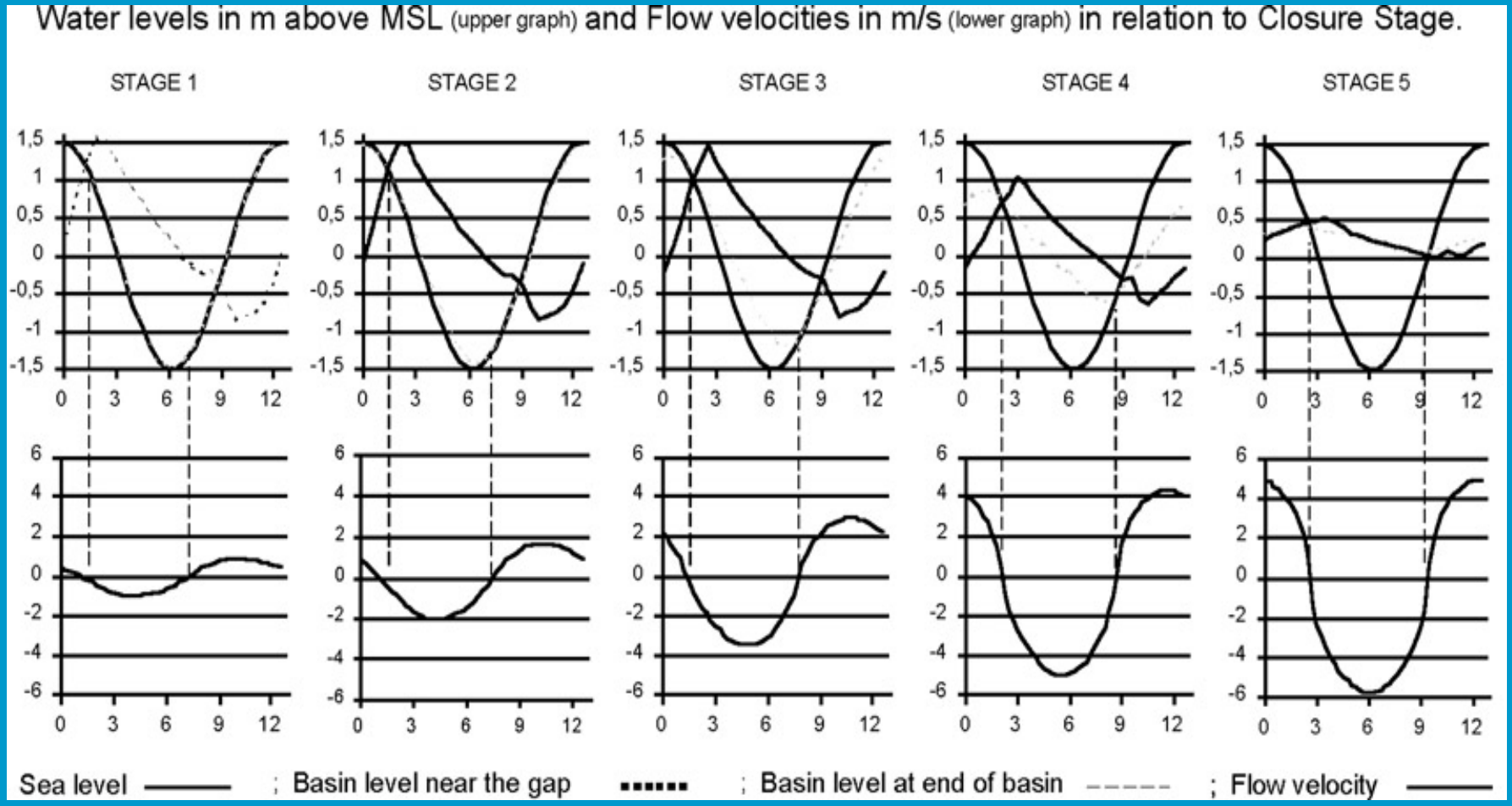
horizontal closure, long basin (16.6)



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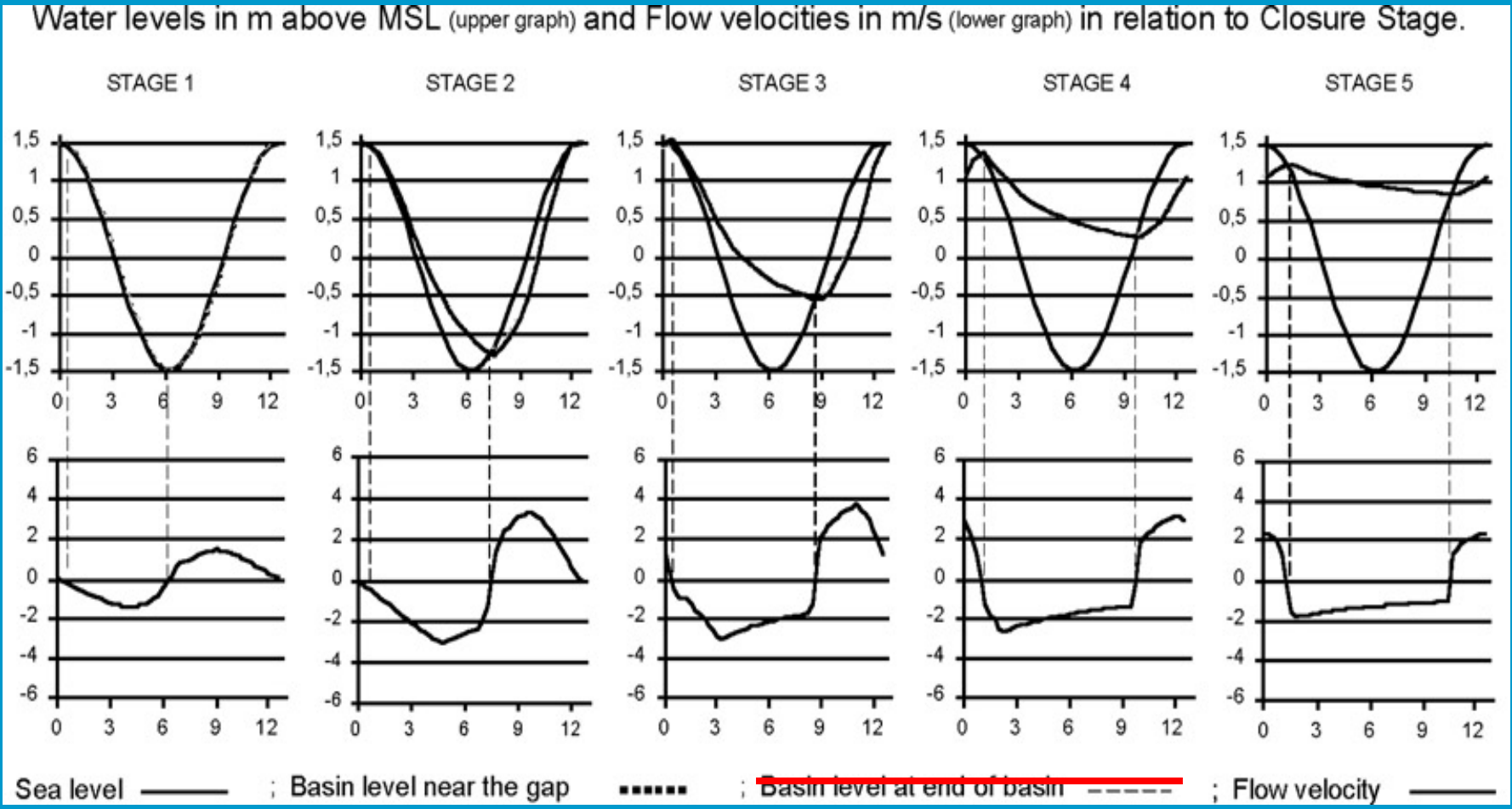
vertical closure, short basin (16.7)



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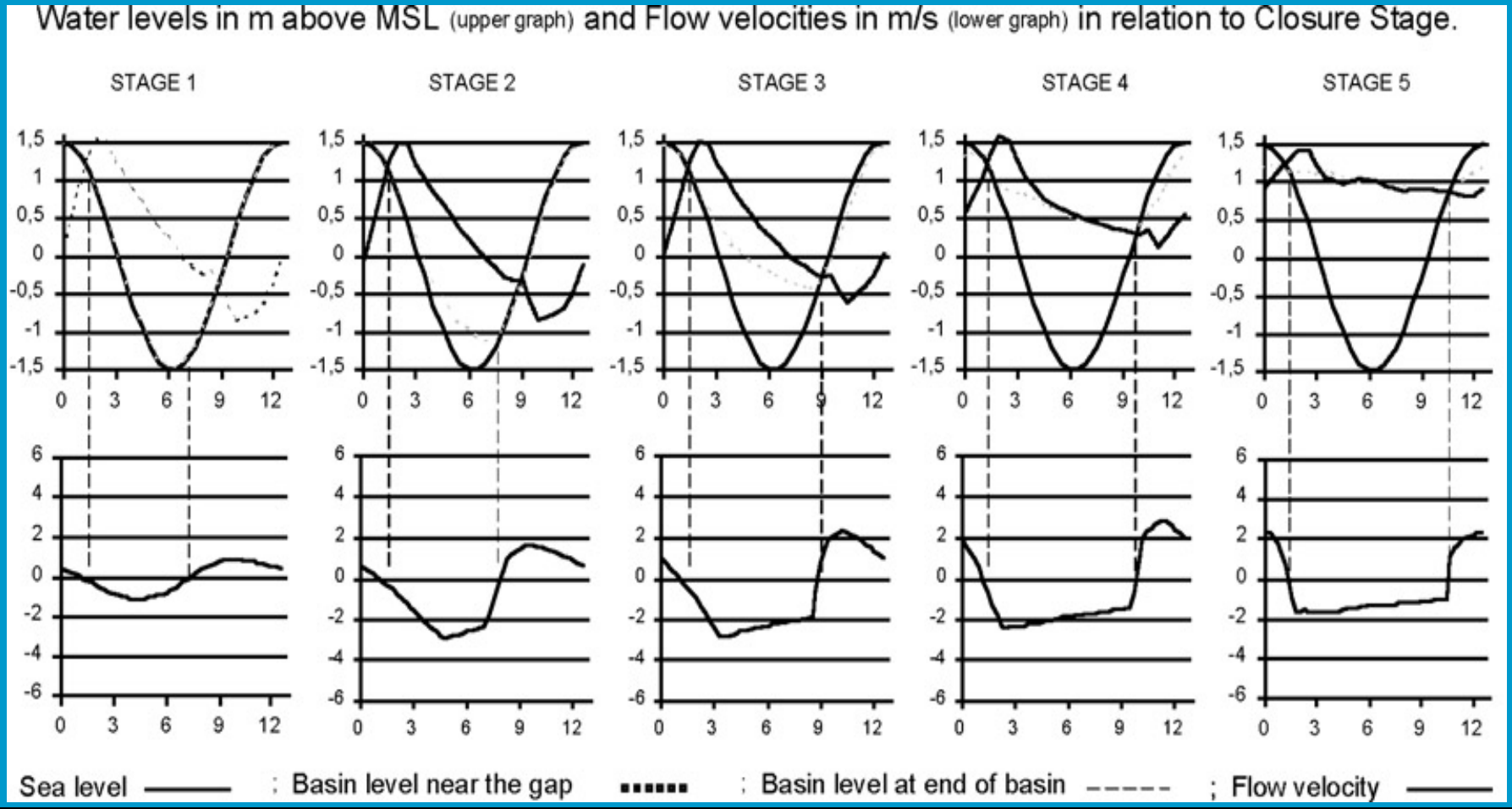
vertical closure, long basin (16.8)



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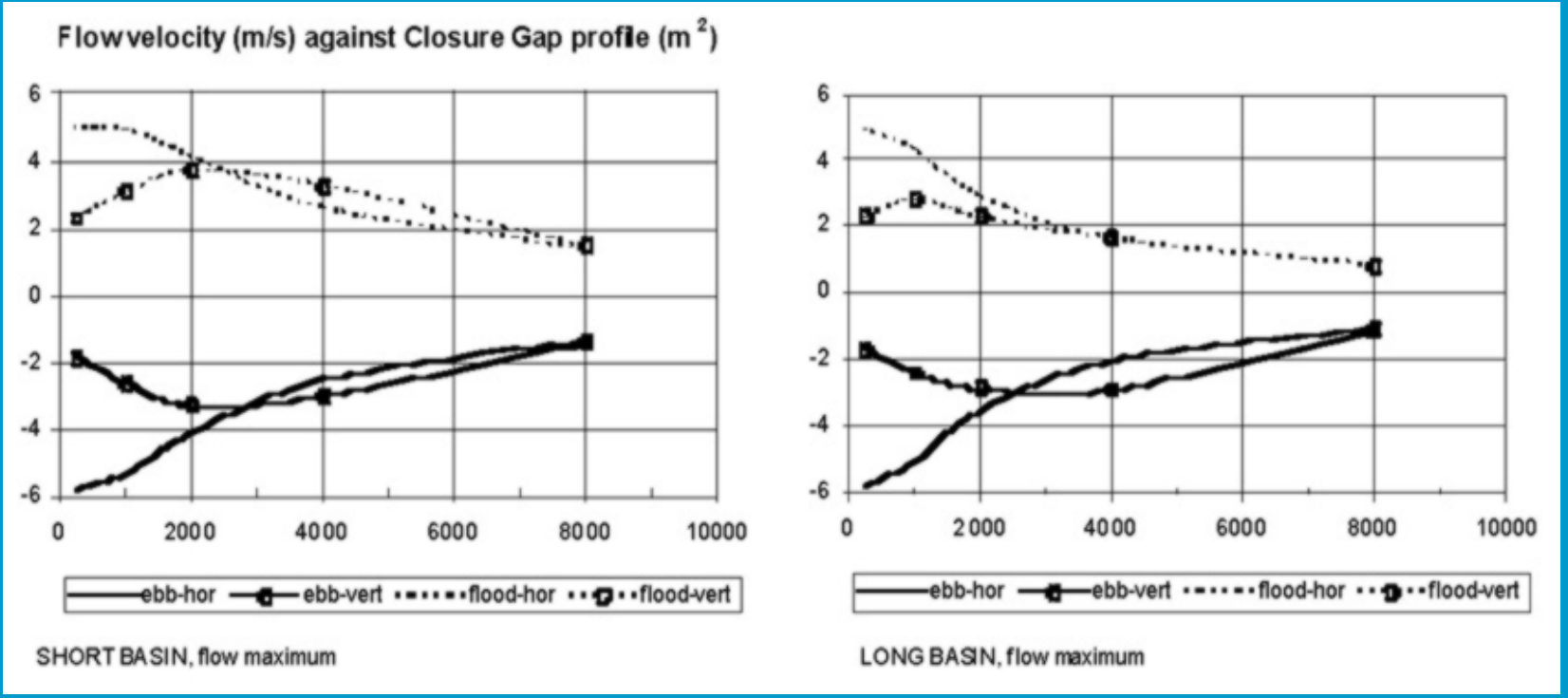
flow velocities depending on closure methods and gap-size



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