WSE-Hydroinformatics – Module 05

River System Modelling

EXERCISES

Mike 11

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Mike 11 Modelling exercises

Exercise 1: Model a simple channel

Make an analysis of routing a hydrograph through a steep (0.001 slope) and mild (0.0001 slope) straight channel of 50 km length. The hydrograph raises from 140m3/s to 1000 m3/sec in 12 hours and resides in the next 12 hours.
Consider a channel with a rectangular cross-section of 50 m width (narrow) and of 500m width (wide). Manning coefficient is 0.035.

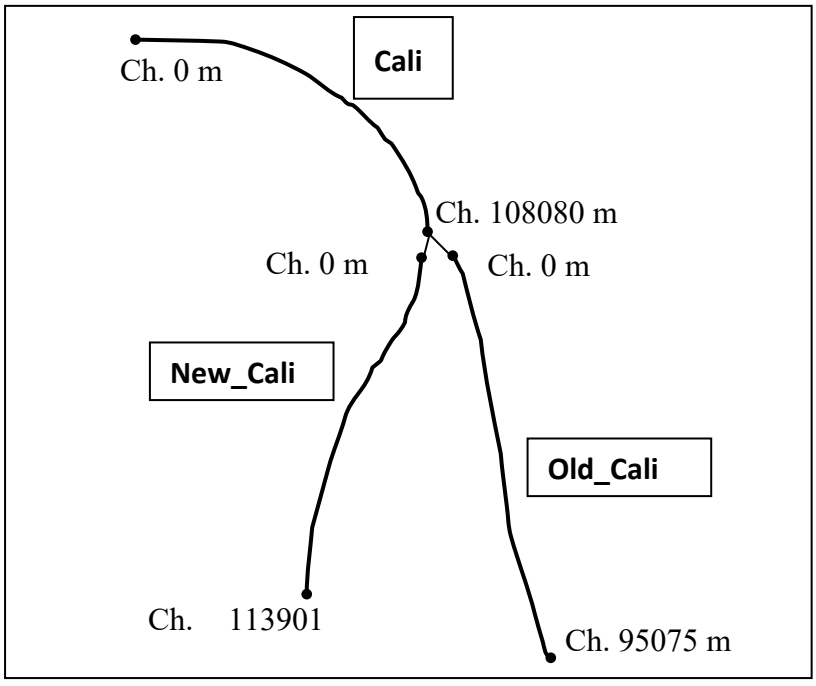
The downstream boundary condition should be the rating curve corresponding to the steep and mild channel and to the considered cross-section.
The length of simulation is 36 hours.

Exercise 2. Calibration of a model

A river system consists of four river branches:

Cali :chainage 0 - 108080 m
Old_Cali : Chainage 0 - 95075 m
New_Cali : Chainage 0 – 113901 m

Connections between river branches are illustrated in the figure below:



Cali model, along with cross section file (XNS11) of all sections for the rivers, and timeseries files (dfs0) used for boundary conditions are available in the demo section of Mike 11.

2.1 Develop the initial river model as described above.

- use Default Manning number as global value (M=30 m1/3/s)
- in the default page (HD Parameter file) change value of DELTA from 0.5 to 0.75
- use Simulation time: 29/7-1989 00:00:00 to 4/10-1989 09:00:00, Dt = 10 min.
- Initial conditions: Steady State

Perform simulation and view results with MIKEView

2.2. Perform the following modifications to the initial model:
- Decrease M in Old_Cali to 20 m1/3/s
- Specify new result-file name in Simulation Editor
- Keep all other input data like in 4.2.1.
- Perform simulation

2.3. Repeat 2.2. by increasing M in New_Cali to 40 m1/3/s

2.4. Calibrate the model by adjusting M in the river. Use the following points for performing the calibration:

Water level comparison			**Discharge comparison**		
	Chainage	File with observation data		Chainage	File with observation data
New_Cali	27365 m	NEW_CALI_WL-H.DFS0	New_Cali	22804.2 m	NEW_CALI_DIS-Q.DFS0
Old_Cali	25098 m	OLD_CALI_WL-H.DFS0	Old_Cali	20915 m	OLD_CALI_DIS-Q.DFS0
Cali	98982 m	CALI_WL-H.DFS0	Cali	94448 m	CALI_DISCH-Q.DFS0

Use the following values of M for calibration:

River	**Chainage**	**M**
Cali	0	25
Cali	108080	25
Old_Cali	0	45
Old_Cali	56350	60
Old_Cali	95075	60
New_Cali	0	35
New_Cali	62934	50
New_Cali	75934	50
New_Cali	113901	60

Exercise 3.

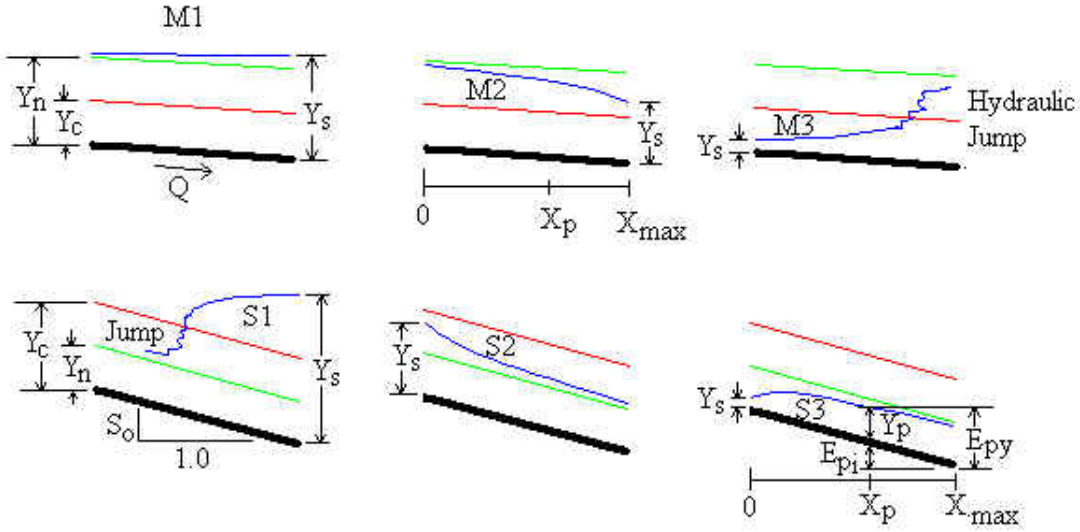
Build a model which will simulate a dam break situation. Consider a channel of 1000m length, with a dx=25 m, and a dt=2sec. The upstream boundary condition is 15m water level and the downstream boundary condition is 10m water level. The channel is horizontal and is frictionless (i.e. M=10000)
The dam is considered to be positioned at the middle of the channel, at chainage 500m.
The cross-section is 50m wide and 20m deep.
Simulate the case for 12 hours.
What is happening if the downstream boundary condition is 1m, instead of 10 m.

Modelling assignment
Due date: March 2, 2020 12:30 o'clock
Submission: on ecampusXL

Assignment 1.
Assignment consists of building one Mike11 model: Your task is to build a Mike 11 model for a 5000 m long channel, with a _____m width cross-section. Determine initial conditions and boundary conditions downstream so that you will obtain a (M1/M2/M3/S1/S2/S3) water profile curve in the channel. The upstream boundary condition is a constant discharge of 500 m3/s. The slope of the channel is 0.0001 for M curves and 0.002 for S curves. If needed split the channel in two parts, so that you will obtain the water level profile requested by the assignment.

Submit a report with the explanation of the results you have obtained, and submit your Mike 11 model.

Remark: The shape of the water level profiles are: (M1/M2/S1/S2)



Assignment 1 alternative (Bonus) – Build in Mike 11 the Sobek case you built in the class (or the Sobek assignment case). In case you choose the Bonus assignment you do not have to do Assignment 1 described above. The report on this assignment should describe the model you built and the steps you took for building it.