

# CEE3430 Engineering Hydrology

## Homework 7. Flood Routing

Date: 2/28/11

Due: 3/14/11

**Objective.** After completing this assignment you should be able to calculate the outflow hydrograph from the inflow hydrograph to either a reservoir or river reach. You should be able to do this by hand, in Excel, and using the HEC-HMS program.

1. Bedient 4.2. Work out your answer by hand or using Excel, but then verify your results using HEC-HMS.

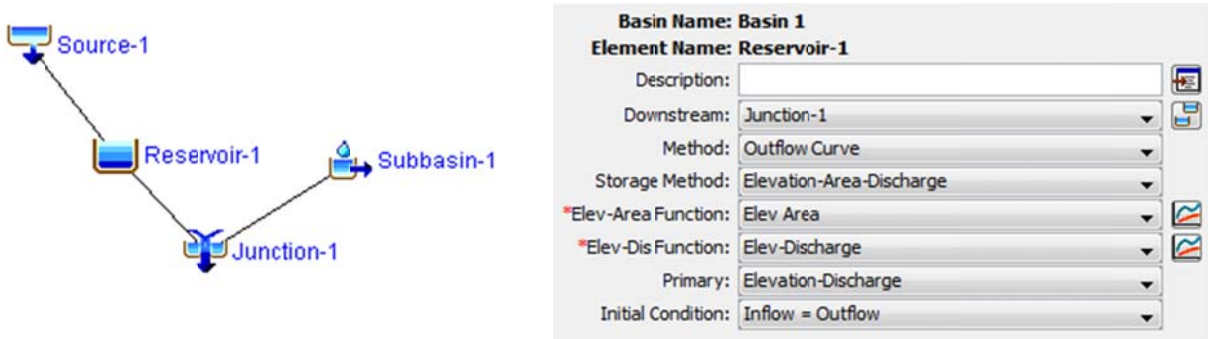
Guidance on setting up HEC HMS Model.



- In HMS create a new project
- Create a Basin Model and add a Source, Reach, Junction and Subbasin, connected as indicated above. The subbasin is artificial to be a receptor for rainfall that is not part of this calculation but seems to be needed for HMS to run
- Set the reach routing method to Muskingum and enter the parameters
- Open the Time-Series Data Manager and create a new Discharge gage
- Set the Time Interval for this Discharge Gage. Create a Time Window and enter the Inflow data in the Discharge Gage table.
- Set the flow method for Source to be Discharge Gage and set the inflow to be your inflow discharge gage
- Create a Control Specification specifying an 18 hour time span with 2 hour time steps consistent with the Inflow data  
[This is actually all the information needed to solve our problem, but for HEC HMS to run it seems to need meteorology, so I made some up connected to the downstream junction where it is inconsequential]
- Create a Meteorologic Model with specified Hyetograph
- Using the Time Series Data Manager create a new Precipitation gage
- Enter some fictitious (but reasonable, e.g. 5 mm for 2 hours) precipitation data for the Precipitation gage
- Set all the methods for the subbasin to be None and give it a fictitious area (e.g. 5 km<sup>2</sup>)
- Include Subbasins for the meteorology Model and for your subbasin specify your precipitation model
- Create a simulation run with your basin model, meteorology model and control run.
- Run your simulation. Examine the results from the simulated reach. Ignore results at the junction where the fictitious precipitation has been included.

2. Bedient 4.7. Solve this using the following three methods and compare your results
  - a) Storage Indicator (Puls) method
  - b) Runge-Kutta method
  - c) HEC-HMS

For the HEC HMS model use a configuration similar to below.



The source component should be the Inflow hydrograph. For the reservoir component use the Outflow Curve Method and specify Elevation Area and Elevation Discharge functions as Paired Data tables with values evaluated using the equations given in the problem. As for problem 1, use fictitious but reasonable data for the meteorology model going in to subbasin 1 to get HEC-HMS to run.

3. Bedient 4.24. This is an extension of 4.7 to a case where the reservoir has variable area. You do not have to do all three methods for this problem, just use one of them (i.e. Storage Indicator, Runge-Kutta or HEC-HMS) and compare your results to the solution of 4.7 with the same method.