HEC-HMS Lab 9 – Routing a hydrograph using Muskingum Method

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Learning outcomes

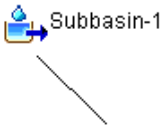
The objective of this lab is to learn how HEC-HMS is used to route a hydrograph using Muskingum Routing in HEC-HMS. By the end of this exercise, you will:

1) Know how to create a reach in HEC-HMS
2) Route the flow using Muskingum channel routing method
3) Understand the effect of Muskingum K and X parameters on the outflow hydrograph

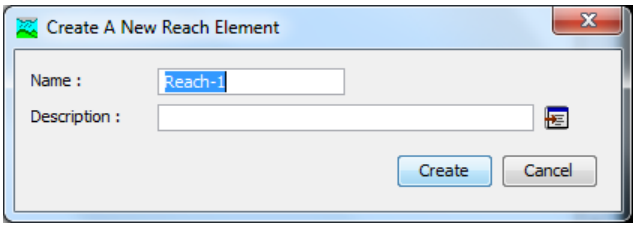
Student Time Required: 60 minutes

Instructions

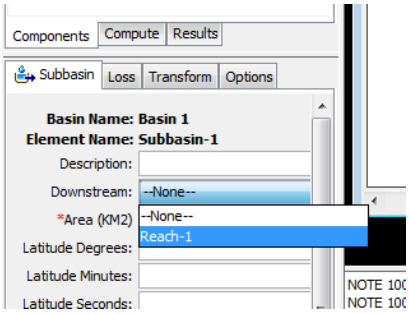
Open Lab 5 HEC-HMS model where you created hydrographs for multiple frequency storms. Save your project as Lab9 (or any other new name). The objective of this Lab is to reduce the flow of the 100 year storm by routing it through a channel. In HEC-HMS, a channel is added to a basin by using the Reach tool  . Add the reach to the basin model by selecting the tool and drawing a line on the Basin window as shown below.



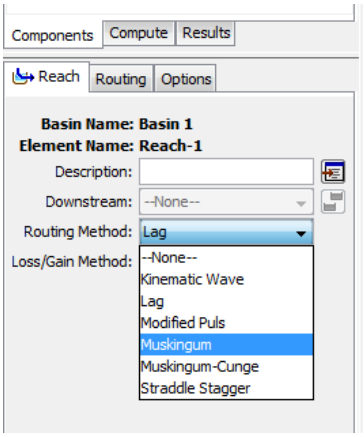
Once you do that, you should get a window asking you to enter the name of the reach as shown below



Accept the default name and proceed. Next you will link the reach to Subbasin-1 by specifying Reach-1 as the downstream element as shown below.



Next, select the Reach element and specify Muskingum as the routing method.



Leave the Loss/Gain method as none.

Specify the Muskingum routing parameters as K = 0.5 and X = 0.1.

Save your project. Create a new simulation and run the simulation using 100 year design storm.

Look at the hydrograph result for the reach. The dashed line shows the input to the reach (outflow from the subbasin) and the solid line shows the final output from the reach. You should see some attenuation in the hydrograph from the reach compared to the one from the subbasin. Record the delay in the peak and the reduction in peak magnitude. Next change the X values to 0.2 and 0.25. Record the corresponding delay in the peak and the reduction in peak magnitude. Now, leave the X value unchanged to 0.25, and repeat the simulations for K = 0.6, K = 0.75 and K = 1.0.

Now that you know how the Muskingum X and K affects the hydrograph, play with these values to bring the hydrograph peak and the time of the 100 year event to match with 50 year event.

Turn-in (Due 11/12/2018 by 5 pm):

- Presentation quality hydrograph of 50 and 100 year events (in one Chart).
- A table showing the value of X, peak flow time and peak magnitude.
- A table showing the value of K, peak flow time and peak magnitude.
- Presentation quality hydrographs of 50 year event (without reach from Lab 05) and attenuated 100 year event (outflow from the reach) after adjusting K and X. Present both hydrographs on the same plot using appropriate line types and legend. Report final values of K and X.
- Few lines on what you learned from this exercise.