## Modifications to VFSMOD user manual (version 6, uploaded on the 30th of november)

NB: p27, there is a mention to NRCS 10-min hyetograph (\*.hyt file) : not correct anymore ?

Fp: ponding factor is always taken= 0 in UH ?

**P80:**

Storm type storm type (1=I, 2=II, 3=III, 4=Ia, 5 = User, 6=User1). See example 2.3.1.4 below for User Type and 2.3.1.5 for User1 type

**P81.**

*2.3.1.4 File example with user storm type*

Notice that in this case Storm type in the INP files is set to “5” and the user must provide at the end of the header “tmid(hr)”, the time to the middle time in the storm (where P/P24=0.5), followed by the normalized (P/P24) 24-hr cumulative precipitation curve. See example in the ZIP download. Notice that although the curve must be provided for 24 hrs., the program automatically scales the curve to the user selected duration(D), centered around tmid time, considering that the shorter the rain event, the more intensive the rainfall.

Example

*2.3.1.5 File example with user1 storm type*

Notice that in this case Storm type in the INP files is set to “6” and the user must provide at the end of the header “tmid(hr)”, the time to the middle time in the storm (D/2), followed by the corresponding P. In this case the user must provide the actual cumulative precipitation curve, without any normalization: the given curve is going from (0,0) to (D,P) and is taken into account as is: see example in the ZIP download.

Example

**P22**

*3.1.3 “User type” hyetograph*

Two “user type” kinds of hyetograph are possible, in case observed rainfall data is available for the user.

**In the first case**, a normalized hyetograph corresponding to a 24 hours period must be provided, and is treated as in equation(16), considering that a rainfall event shorter than 24h must be centred around the steepest part of the curve.

Do we need an example?

**In the second case**, any cumulative hyetograph can be provided (shape and duration). The hyetograph is then divided in several elementary rainfall events rn. For each elementary event rn the corresponding excess rainfall is calculated and convoluted with the unit hydrograph to give the final hydrograph entering the buffer zone. For each of these time interval, the corresponding rainfall intensity is given by:

In [m/s]: rainfall intensity for interval n

P [mm] : total rainfall ,

D [s] : duration of the rainfall event

Cn [-]: proportion of rainfall fallen during interval n

 where:

The excess rainfall hyetograph is built using Chow et Maidment (1988) equation:

**[Eq.7]** 

* R (mm): cumulated excess rainfall
* P (mm) : cumulated rainfall
* Ia (mm) : cumulated initial abstraction
* Ia SCS (mm) initial abstraction as calculated in eq 3)
* F (mm) : cumulated infiltration
* S (mm) as in eq 18

**[Eq.8]**  Si P < Ia SCS

 Si P > Ia SCS

**[Eq.9]**  if P > Ia

F = 0 if P >=Ia

These equations apply on cumulated water heights: in order to obtain the excess elementary rainfall to convolute it with the unit elementary hydrograph, one has to come back to instantaneous rainfall: rn = Rn-Rn-1 .

In both “user” cases, elementary excess rainfalls are convoluted with a unit hydrograph defined as:

Def = 0.24\*tc tc: concentration time (h) (eq 21)

tp = 0.6\*tc + 0.5 Def tp: time to peak (h)

qp= 0.127481\*A/(t\*60) qp: peak flow (m3/s)

A: watershed area (ha)

q(t)/qp = [(t/tp)\*10(1-t/tp)]ck ck= 3.77

tracer la courbe ?

**P31**

Revise Table 1, SF, *Very fine sandy loam* should it be -0.0325? Check original reference and tables.