Computer (HEC-HMS) application for modeling and reconstraction outflow river

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Introduction

By now, the trailing dam of the National Iranian Copper Industry Company is full. More hydrologic studies should be conducted on the river to increase the capacity of the dam. The discharge of the river have been measured once in 10 days since 1995 to 2001. But since 2001 till now the river discharge id meashured daily. This kind of measurement can make the data somehow problematic. If the flood of a river happens during a time when the measurement is not done, the total water of the river will be less than the actual value. On the contrary if the time of measurement be the same with with the maximum discharge time of the river, the total water of the river will be more then the actual value.

Regarding to different rainfall conditions and comparison between their floods we can easily see an inaccuracy in measured data. For example on 2001/12/16 and 2002/3/28 the rainfall was recorded as 12.5 and 11.6 mm respectively. In spite of more humidity on 2002.3.28 and more rainfall the total water of the river was less. So, these data can not be a good representative of the behavior of the river. In this paper we try to simulate the behavior of the river using HEC-HMS program.

After reexaminig and approving of this model we can reconstruct the missed data of discharge using rainfall data.

Discussion

The input data of the model consists of flood data, rainfall, evaporation and basin parameters. Here, the daily data of the river discharge which was measured in 75 station and measured evaporation and rainfall values measured in Mine climate, the other parameters like penetration rate, the Conopy capacity and so on …should be also defined. Although some of these parameters can not be measured and should be estimated during examining stages. In this stage, during of a trail and error process the model parameters are estimated and the resulted data which was concluded of the model performance was compared with hydrograph of measured data. As the river discharge is measured once a day in reexamining process there can be unlimited hydrographs which pass from the measured point. It is well demonstrated in figure 1. To choose a real hydrograph, first transport model parameters (single hydrograph) should be estimated using theoretical concepts and then basin models and base discharge are reexamined.

In this stage we tried to pass stimulated hydrographs from daily measured data and base discharge specifications were concluded to reexamine the model, those rainfall parameters which their flood seemed to be closer to reality were used. They includes December 22, June 23, February 5 on 2003. Figure 2 and 4 illustrates the results of reexamining.

After reexamining stage the model should be approved . So the model was performed from 2003/1/27 to 2003/2/7. In this period of time 3 rainfall have happened. The stimulated hydrograph passes from those tree points and the base discharge is stimulated well. Figure 5 shows the stimulated micrographs. The model also was performed for the data of 2003/2/20 to

2003/3/20. Figure 6 shows the stimulated microgarph for this performs. While comparing stimulated data with real data we can see a good correlation between these two which is very important.

In some cases, in spite of presence of floodal rainfalls, real data have not recorded any flood. But they have been well stimulated by stimulated data. This point shows the unaccuracy of discharge measurements in Shur river.

The rainfall data were measured in mine station since 1983 till now. Therefore the rainfall data which were used and its equal flood were stimulated. Figure 7 illustartes the stimulated total water of the river with annual rainfall. As figure 7 shows there is a good correlation between the total water of the river in a year which was stimulated by the model and the value of rainfall in that year. Regarding to rainfalls with different return periods the maximum instance discharge and it's valume was stimulated.

Figure 8 shows the maximum instance discharge with different return periods. Figure 9 shows the valume for floods with defferent return periods. The result of these studies is shown in figure 8.

Two major rainfalls happened on December 1986 about 436.2 mm and on March and February of 1999 about 513mm. According to the results of the model, each of these happening will produce a flood of 15.8 and 9.7 million m^3 ,respectively in Nazar abad station.

In spite of that the rainfall in December is less than February and March, the stimulated rainfall by the model shows more values for December.

It's because of distribution and the rate of rainfall and also the value of evaporation and the humidity condition of the soil.

Conclusion

One of the most important parameters for the successfulness of a water design is the present historical data. Unfortonately we don't have a good statistics. Also in many cases the present data are not complete and sometimes the device are out of order and so on. So, the data are not continues. Of course sometimes the precisness of measured data is not enough as shown in this paper. The HEC- HMS program is a very useful instrument to analysis and reconstruct the river discharge data. So, in some cases the discharge of the river is not recorded or the data are not complete, with discharge measurement in a short period (at least 2 years) by using this program we can stimulate the river behavior. When the value of rainfall is measured in an area we can stimulate the discharge river data.