On flood simulation of lower reach of the Yura-gawa River by finite volume method

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ABSTRACT

In recent years, there were so many floods in many first-class rivers in Japan. A lot of people in the Yura-gawa River, a first-class river, have suffered from flooding caused by Typhoon No.16 in 2004 and Typhoon No.18 in 2013. The Yura-gawa River has 1,880 km\(^2\) drainage area and is a medium-sized river of 146 kilometers in length. At present time, a ring levee surrounding a village and its levee raising have been conducted as a countermeasure of river flooding in the Yura-gawa River by the Ministry of Land, Infrastructure and Transport in Japan. On the other hand, the inundation inside a ring levee has frequently occurred by a sluice gate constructed between the levee and the Yura-gawa River. The sluice gate has no drainage pump because of economic problem. River flooding analysis needs a topographical map, which is made from three-dimensional map information database in the Geographical Survey Institute in Japan. In this paper, the effect of ring levee on the river flooding in the Yura-gawa River is numerically investigated on a topographical map by the finite volume method.

The summary obtained in this paper is as follows.

1. River flooding simulation on a topographical map made from three-dimensional map information database including a lot of existing geographical conditions can conduct by the finite volume method.

2. River flooding in the lower reach of the Yura-gawa River caused by Typhoon No.16 in 2004 when ring levee has not constructed can be accurately simulated by the finite volume method.

3. Ring levee surrounding a village has a significant effect against river flooding in the lower reach of the Yura-gawa River under the condition of Typhoon No.16 in 2004. Consequently, heavy river flooding in the lower reach of the Yura-gawa River may be dependent of the height of ring levee.

REFERENCE


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