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英文题名	Study and Application of Distributed Hydrological model of Beiyunhe
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中文文摘	北运河是北京市北部区域重要的泄洪通道，其流域的洪水预报和调度系统也是北京奥运会重要的安保措施之一，建立该区域快速和准确的预报与调度系统具有重要意义。北运河流域面积不大，约 4348 km2，但流域下垫面条件较为复杂，主要有山区，平原和城区三部分。要对全流域洪水进行模拟预报，必须先模拟出不同地区洪水产生的基本状况。而且洪水模拟预报要求系统采用的预报模型不仅模拟精度高，还要运行速度快。分布式水文模型主要有基于子流域，基于栅格和基于坡面三类。基于子流域的模型主要采用经验公式或概念性的方法来计算产流，之后采用传统方法如马斯京根法来进行汇流演算，而且采用的时间步长较大，不适合对时间尺度和模拟结果精度要求较高的洪水预报；基于栅格的模型，由于主要基于数值方法来模拟产汇流过程，虽然在精度上能满足要求，但耗时较长，无法实现洪水的实时预报；而基于坡面的分布式水文模型，把坡面作为产汇流计算的基本单元，对实际流域虽做了一定的概化，但能反映其基本特性，如单元面积，河道长度，坡面坡度，河道坡度等，在汇流部分基于一定的物理机制，模拟速度快，计算结果精度高。因此采用基于坡面的分布式水文模型 DWSM 来模拟不同降雨情况下的产汇流情况。论文以北运河流域实测降雨（1998.7.3~7.6）和该流域主要断面的调查流量为资料来率定北运河流域洪水预报与调度系统的模型参数，以不同设计降雨（设计频率为 10、20 和 50 年）和水库、蓄滞洪区的初始水位为输入资料，模拟了不同设计降雨和水库、蓄滞洪区调度方式下，北运河流域的产汇流、支流汇入以及水库调控等因素对洪水演进的综合影响。模拟结果与北京水利规划设计研究院的计算结果进行比较，得到在前期无雨情况下，采用 DWSM 模拟的流量峰值与设计院的计算峰值在各断面比较接近；而在前期有雨情况下，蔺沟和小中河等区域的模拟值与设计院计算的峰值误差较大，究其原因除了模型基于概化的坡面结构特点引起误差外，主要是雨量站的数量太少导致降雨输入误差大，从而造成模拟的峰值误差较大。
外文文摘	Beiyunhe River is the crucial flood discharge channel for northern Beijing downtown, and flood forecast decision support systems acted as one of the most important safety measures. So it ‘s extremely meaningful to develop the real-time and accurate flood risk forecasting management systems for Beiyunhe River Basin. Area of Beiyunhe River Basin is about 4,348 km2, but underlying surface，composed of hill, plain and urban zone, is very complex. It should firstly simulate flood from different sources to make flood forecast in the whole basin. Moreover, flood simulation and forecast needs rapid speed as well as the accurate result.Distributed hydrological model consisted of three types based on subbasin, grid and hillslope. The first type adopted empirical and conceptual method to calculate runoff generation, used traditional approach, such as Muskingum method to simulate runoff concentration with daily time step in general. So it wasn’ t suitable for finer time step and higher accuracy for flood forecast. The second type simulated runoff yield and concentration according to numerical law and have satisfying results, but it took too long time to finish real-time forecast. The third type, based on the hillslope, treated hillslpoe as basic unit, made certain generalization reflect basin’ s characteristics. For example, unit’ s area, channel’ s length, hill and channel slope. And the type had physical law in process of runoff afflux, featured with rapid simulation rate, and high accuracy of calculation. So DWSM based on hillslope was used to simulate runoff yield and concentration under different rainfall conditions. Besides, the dissertation adopted measured rainfall of Beiyunhe River Basin (July 3, 1998 to July 6, 1998) to calibrate main parameters of DWSM, used design rainfall (frequency of 10%, 5% and 2%) and relevant initial water levels of reservoirs and flood storage zones as input data, and simulated integrated influence of runoff generation and concentration, tributary inlets, and reservoirs’ regulation in Beiyunhe River Basin upon flood routing. The DWSM’ s results were compared

	with calculation results of Beijing Institute of Water (BIW). For dry condition of antecedent soil moisture, simulation results of DWSM were close to output from BIW, for wet condition of antecedent soil moisture; DWSM's results had larger error with BIW calculation. The reason may be structural character of conceptual hillslope segment of DWSM, and also few data of rainfall gauges for model's input. Especially second factor should be responsible for the peak flow's error.
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