Computation of grid storage capacity from topographic index in hydrological modelling

PENG SHI¹, XIAOFANG RUI², SIMIN QU² & XI CHEN¹

¹State Key Laboratory of Hydrology-Water Resources and Hydraulic Engineering, Nanjing 210098, China
ship@hhu.edu.cn; ship_sohu@sohu.com
²College of Water Resources and Environment, Hohai University, Nanjing 210098, China

Abstract Recent advances in the field of GIS have made possible the development of distributed hydrological models. However, there are some unsolved problems in full real-time distributed hydrological models. In view of these problems, an alternative conceptual distributed hydrological model is proposed in this paper. Determination of water storage capacity for every grid cell has become an important problem in conceptual distributed hydrological models; taking the similarity between the maximum grid soil moisture deficiency and the grid topographic index into account, it was found that a logarithmic Weibull function relationship exists between them. Based on this, a method to calculate the grid storage capacity from the grid topographic index is proposed. The method was applied in a grid distributed hydrological model with non-compact structure. Results obtained show that in an ungauged basin it is possible to get some of the hydrological parameters from the geographic parameter set. The main conclusion of this paper is that the findings here suggest a promising alternative way for hydrological modelling.

Key words distributed hydrological model; topographic index; grid storage capacity; logarithmic Weibull function