

EVALUATION OF FLOW RESISTANCE INDUCED BY SUBMERGED VEGETATION

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Vegetation influences in many ways the flow processes within a river basin. With respect to overland flow the travel time of precipitation from the point of occurrence to the draining river is not only a function of the topography, but to an important extent of the vegetation cover. Empirical formulas like the KIRPICH-Formula do not consider this effect. Physically better proven are approaches, which are based on hydrodynamic fundamentals like the following formula:

$$t_{\text{total}} = \sum_{i=1}^n t_i = \sum_{i=1}^n s_i \sqrt{8g/\lambda_i \cdot h \cdot I}$$

with s = length of path section i , t_i = travel time of water within path section i , h = water depth, λ = friction factor, I = slope, n = total number of different path sections. To solve this equation, the friction factor λ has to be evaluated. In most cases of overland flow the water depth has the size of vegetation height or smaller. For this submerged vegetation a method was developed by which λ can be evaluated purely on the basis of the geometric parameters stem diameter and distance of vegetation elements. Originally developed for the friction evaluation of riparian forests on flood plains this method was extended to overland flow. The method will be described and the benefit for overland flow modelling will be discussed.