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示踪法测量坡面水流速度理论缺陷分析(PDF)

Title: Analysis of faults in theory for measuring flow velocity on slope with tracer method

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关键词： 示踪法；水流速度；经验系数；泥沙含量

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摘要： 示踪法需对经验系数进行修正才能得到水流速度；而经验系数受多种因素的影响,在不同的条件下如何使用,有较大的随意性。对溶质运移数学模型解析解的分析发现,由溶质浓度在观测点达到最大值的时间计算得到的速度无法推算出实际水流速度,以此为基础的染色示踪法或盐液示踪法存在着理论上的缺陷。溶质的弥散系数对示踪法测量水流速度也有较大的影响,弥散系数越大,质心到达观测点的时间与浓度最大值到达该点的时间偏离越远。在实验测量中,泥沙含量对经验系数影响较大,这可能是其影响弥散系数的结果；理论上水流速度增大使经验系数增大,但在实验测量中不同泥沙含量下水流速度对经验系数的影响并不显著,因此在修正经验系数时必须考虑水流中的泥沙含量和其它水质差异。

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Abstract: In the conventional tracer method, the flow velocity is determined by the time for the tracer to cover a certain distance, and an arbitrarily chosen empirical correction coefficient. The empirical coefficient is in fluenced by many factors. The analytical solution of mathematica lmodel for solute transport in flowing water was graphically shown that the velocity of flow can not be calculated with the estmiated velocity by the time for the peak solute concentration to cover a distance from the in jection location to the measuring point, as used in color or salt tracer method. The conventional tracer methods for velocity determination have theoretical faults. The dispersion coefficient of the solute has significant effect on the velocity measured by the tracer method. The bigger the dispersion coefficient, the larger the time interval between the peak and centroid arriving tmie. The sedmient concentration affects empirical coefficients and the dispersion of solute transport. Theoretically, the velocity enhances the coefficients, but there is not significant relation between them. Therefore, the sedmient contentor the water quality should be considered and different correction coefficient should be used while measuring the velocity of flow using tracer method.

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