重力坝多失效模式相关层间抗滑稳定体系的可靠性分析

Reliability analysis for multiple failure modes related sliding stability system between layers of gravity dam

中文关键词：重力坝　可靠度　Copula 函数法　多失效模式

英文关键词：gravity dam　system reliability　Copula function method　multiple failure modes

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中文摘要：

　　提出了基于Copula 函数的重力坝多失效模式相关体系的可靠性分析方法。运用多元Copula函数建立了重力坝层间抗滑稳定相关体系的联合分布模型，从理论上推导了基于opula函数求解体系相关可靠度的计算式；然后采用非参数估计方法确定了相应Copula函数中的待定参数。通过算例，验证了基于Copula函数的相关性可靠度分析模型的合理性，接着对某重力坝多失效模式相关的层间抗滑稳定体系进行了可靠性分析，并与传统方法的计算结果进行了对比。算例结果表明，Clayton Copula函数可以作为表征重力坝串联体系可靠性中失效模式间相关结构的最优Copula函数，基于Copula函数的相关性可靠度模型计算结果克服了基于独立性假设的一阶、二阶区间估计等方法的局限性，且仍在Ditlevsen二阶界限区间估计值的范围内，能够满足工程问题的精度要求。

英文摘要：

　　System reliability analysis method for multiple failure patterns of gravity dam is put forward based on the Copula function. The joint distribution model is established using Copula function of stability between layers of gravity dam， and the computational formula of this system reliability analysis method is deduced theoretically. Then， the parameters in the Copula are determined using the parameter estimation method. The reasonableness of the reliability analysis model is verified through a case study， and then the related sliding stability system reliability between layers is analyzed and also compared with the calculation results of the traditional method. The results show that Clayton Copula function can be characterized as a series of gravity dam system reliability failure mode of the correlation between the optimal structure Copula function， based on the correlation of Copula function reliability model calculation results overcome the limitations of the first and second order interval estimation methods based on the assumption of the indepen? dence， and it can satisfy the precision requirement of engineering problems because the result is still in the range of estimate value of the Ditlevsen method.

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