

天津港地基土随机场特性及可靠度分析

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摘要 阐述随机场理论在进行地基可靠度分析中的作用, 指出合理确定方差折减函数对地基可靠度分析具有重要意义。以天津港大量现场勘察资料为基础, 综合理论和实测数据建立起天津港地基土性剖面的随机场模型, 统计出本地区典型土层的相关函数、相关距离及完全不相关距离值。讨论在土工可靠度计算中如何正确选取并合理应用方差折减函数, 提出方差折减函数的确定原则, 确定本地区方差折减的范围值, 并将其应用于港口边坡稳定的可靠度分析。分析结果表明随机场的应用对地基可靠度起到重要作用, 按照方差折减函数的确定原则对强度指标进行方差折减后得到的可靠度指标与工程的实际安全程度较为匹配。最后对边坡稳定可靠度计算中随机变量 c , j 的敏感性进行分析, 结果表明, j 的变异性对可靠度指标的影响较 c 更为敏感。

关键词 [基础工程](#); [随机场](#); [可靠度](#); [相关函数](#); [方差折减函数](#); [相关距离](#)

分类号

RANDOM FIELD MODEL AND RELIABILITY ANALYSIS OF FOUNDATION SOIL IN TIANJIN PORT

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Abstract

The theory of random field plays an important role in reliability analysis of foundations. The key to application of random field theory to reliability analysis is how to combine the reduction function of variance obtained by the random theory with the reliability theory. Based on a large amount of investigation data in Tianjin Port, a random field model is established for the soil profiles in this area. The correlation function, correlation distance and irrelated distance are studied and the representative values of them of local area are provided. In addition, how to correctly choose the reduction function of variance and to reasonably apply it to the reliability analysis is discussed. The principle for determination of reduction function of variance is presented and applied to the probabilistic slope stability analysis. It is proven that the reliability indexes obtained by reducing the variance of shear strength indexes according to this principle agree well with the reliability of practical engineering. The developed method may give guidance to introduce the theory of random field into reliability analysis of soil foundations. Finally, the sensitivity analysis of parameters c and j in reliability calculation of slope stability is carried out. It is concluded that the effect of parameter j is larger than that of parameter c .

Key words [foundation engineering](#); [random field](#); [reliability](#); [correlation function](#); [reduction function of variance](#); [correlation distance](#)

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