

加速混合遗传算法在搜索边坡最危险滑动面中的应用

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摘要 基于简化Janbu条分法, 提出一种加速混合遗传算法, 在无需对边坡最危险滑动面的几何形状进行假设的前提下, 自由搜索最危险任意形状滑动面, 并计算其对应的最小安全系数。该方法是通过把无约束优化的Powell算法作为一个与遗传算法的选择、交叉和变异平行的算子, 嵌入到改进的实数编码遗传算法中而得到的, 它同时具有两种方法的优点: (1) 有较强的自适应能力, 使得收敛速度加快; (2) 还有可能搜索到最优化问题的全局最优解。首先通过一算例验证加速混合遗传算法的准确性, 然后应用于一工程实例。与现场勘察结果对照表明, 加速混合遗传算法搜索到的最危险滑动面与实际情况吻合得很好, 优于简单遗传算法。

关键词 [边坡工程](#); [Janbu条分法](#); [最危险任意形状滑动面](#); [最小安全系数](#); [最优化](#); [加速混合遗传算法](#)

分类号

APPLICATION OF ACCELERATING HYBRID GENETIC ALGORITHM TO SEARCHING FOR THE MOST DANGEROUS SLIP SURFACE OF SLOPE

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Abstract

Simplified Janbu slice method is improved, while the width of every slice is supposed to be equivalent except the first and the last ones. An accelerating hybrid genetic algorithm(AHGA) is presented, which can freely search for the most dangerous slip surface of slope and calculate its

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corresponding minimum safety factor without supposing the geometric shape of the most dangerous slip surface. AHGA is established by setting Powell method in real-code genetic algorithm(GA), which is taken as a genetic operator that parallels to the selection, crossover and mutation operators. The advantages of Powell method and GA such as better adaptive ability, rather high convergence speed are considered in the new method; and this method can get the global optimal solution to the optimization problems. Finally, the accuracy of AHGA is validated by a common example, and then the AHGA is applied to search for the most dangerous slip surface of slope along a highway, and the result is compared with that obtained from in-situ investigation. It is shown that this kind of method can get the more optimal and precise solution than simple genetic algorithm(SGA).

Key words [slope engineering](#); [Janbu slice method](#); [the most dangerous slip surface with random shape](#); [the minimum safety factor](#); [optimization](#); [accelerating hybrid genetic algorithm\(AHGA\)](#)

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