

# 循环饱和作用下长石花岗岩劣化机理研究

## Study on deterioration mechanism of feldspar granite under cyclic saturation

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**摘要:** 粤港澳大湾区地处南海北缘, 沿海坝体的稳定性是沿岸建筑与居民安全的第一道重要防线, 海水的潮汐作用会对沿岸坝体产生损伤作用, 进而对库岸安全构成威胁。珠海沿岸是以长石花岗岩为主要坝基岩体, 强度普遍低于石英花岗岩, 力学研究较少, 循环饱和作用下长石花岗岩劣化机理仍有不足。本文选择珠海市长石花岗岩作为研究对象, 探讨干湿循环对大坝稳定性的影响, 并厘清潮汐作用对大坝稳定性的劣化机理。结合图像互相关数字图像处理方法和声发射宏观监测手段, 从多尺度探究干湿循环诱导花岗岩劣化机理。初期实验结果表明干湿循环对花岗岩力学性质起弱化作用, 干湿循环次数与弹性模量和抗压强度呈负相关。在微观结构方面, 干湿循环的主要影响体现为晶体间胶结物结构的破坏, 循环饱和作用下晶体颗粒会产生非均匀微变形, 其中长石晶体的变形量明显大于石英晶体和黑云母晶体的变形量, 下一步将量化表征晶体颗粒变形差异及相互影响作用, 探究循环饱和作用下微观到宏观劣化过程的内在联系, 更好地服务于沿海坝体稳定性评估。

**关键词:** 长石花岗岩; 干湿循环; 图像互相关

**Abstract :** The Guangdong-Hong Kong-Macao Greater Bay Area is located on the northern edge of the South China Sea. The stability of coastal dam is the first important defense line for the safety of coastal buildings and residents. The tidal action will cause damage to the coastal dam, posing a potential threat to the safety of the coastal building and residents. As the dam foundation rock mass along the coast of Zhuhai, Feldspar granite has a lower strength than quartz granite's. There are less mechanical studies, and the deterioration mechanism of feldspar granite under cyclic saturation is still insufficient. In this paper, we selected Zhuhai feldspar granite as the research object, discussed the influence of cyclic saturation on dam stability and clarified the deterioration mechanism of dam rock caused by tidal action. The mechanism of granite degradation induced by cyclic saturation was investigated from multi-scale by means of digital image correlation method and acoustic emission monitoring technology. The preliminary experimental results show that the cyclic saturation weaken the mechanical properties of granite, and the number of cyclic saturation shows a negative correlation with the elastic modulus and mechanical strength. In terms of microstructure, cyclic saturation destroy the intercrystalline cement structure. The crystal grains deformed imhomogeneously under cyclic saturation, where the deformation of feldspar crystal is obviously larger than that of quartz crystal and biotite crystal. we will quantitatively characterize the grain-scale deformation and interaction between different grains, and probe the relation from micro deformation and macro deterioration mechanism in the future, which will be useful to stability assessment of coastal dam.

**Keywords:** feldspar Granite; cyclic saturation; digital image correlation