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论文

硫酸盐腐蚀下高性能混凝土物理力学性能及影响因素

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摘要：

为了提高地下深部结构在复杂环境中抵抗外界侵蚀的能力，以徐州淮海水泥厂525号水泥、铜山电厂粉煤灰、优质硅粉等为原料配置了5种不同水胶比（0.35，0.32，0.30，0.28和0.26）的高强混凝土(HPC)，对其在硫酸钠溶液中进行加速腐蚀试验。研究了HPC受硫酸钠腐蚀后物理力学性能的时变规律以及不同腐蚀溶液浓度、水胶比（ w / b ）和应力状态等因素对其的影响。试验结果表明：HPC受硫酸钠腐蚀后强度总体上呈现先增加后减小的趋势；质量总体上呈现先降低后增大的趋势。腐蚀溶液浓度越大，后期强度降低越快，质量下降段和上升段的转折点时间越晚； w / b 小于0.28的HPC在硫酸钠腐蚀下强度影响较小，而 w / b 增加，质量下降和上升速率均增大；在4种不同的应力状态下，强度长期变化规律和无应力状态下一致。不同之处，当应力比小于0.3时，硫酸盐腐蚀对强度和质量变化影响很小；当应力比达到0.5以上时，对HPC强度和质量的影响均较大。

关键词： 硫酸盐；高强混凝土；溶液浓度；水胶比；应力状态

Physical and mechanical performance and influencing factors of high performance concrete under sulfate attack

Abstract:

In order to improve the ability of deep underground structure to resist erosion in underground complex environment，a accelerated corrosion test of high performance concrete(HPC) with water-binder ratio (w/b) of 0.35，0.32，0.30，0.28 and 0.26 was done in sodium sulfate solution.The cement was taken from Huaihai Cement Plant with the grade of 525 and the admixtures include silica powder and fly ash which was taken from Tongshan Plant.Physical and mechanical performance time-changing laws of HPC and the corresponding influencing factors，including corrosion solution concentration， w/b and stress state were studied.The test results show that the strength of HPC increases in early corrosion and then declines，while the quality decreases in preliminary stage and then increases.The higher corrosion solution concentration，the quicker compressive strength reduction，and the later the turning point time between declining and rising stage.The influence of corrosion on compressive strength of HPC with the w/b less than 0.28 is little，and with the increasing of w/b ，the slopes in both the declining and rising phases add.The long-term strength change laws of HPC in four different kinds of stress state are consistent with the ones without stress.But they also have differences:sulfate corrosion has little impact on the strength and quality when stress ratio is less than 0.3，while the stress ratio reaches more than 0.5，the influence is bigger.

Keywords: sulfate；high performance concrete；solution concentration；water-binder ratio；stress condition

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