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疏浚底泥湿法制备免烧骨料砖及其性能分析

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摘 要：以太湖疏浚底泥为研究对象，采用含水率为 40%的底泥湿法制备免烧砖，首先将湿泥经抛丸法制成免烧骨料（防水骨料和裹壳骨料），再与胶凝材料混合，压制成免烧骨料砖. 依据建材标准对免烧骨料砖的性能指标进行测试，并与 3 种空白砖（直接掺泥砖、粉煤灰砖、烧结陶粒砖）、两种市售砖（荷兰砖和混凝土实心砖）进行对比. 防水骨料砖与裹壳骨料砖的抗压强度、55 次冻融质量损失率、28 次盐冻质量损失率依次分别为 9.15 MPa、4.32%、1.67%和 12.11 MPa、2.42%、0.87%. 研究表明：免烧骨料砖性能均优于空白砖，与市售砖接近，且裹壳骨料砖综合性能优于防水骨料砖；降低“混凝土–底泥”界面面积能有效提升免烧建材的强度.

关键词：疏浚底泥；湿法；界面；免烧骨料；火山灰反应
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Performance Analysis of Non-sintered Aggregate Bricks Prepared with Dredged Sediment through Wet Process

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Abstract：Taihu dredged sediment with 40% water content was selected as the raw material to produce non-sintered water-proof and wrapped-shell aggregates through wet process. The modified aggregates prepared from wet dredged sediment were mixed with cementitous materials，and then formed into non-sintered bricks through press shaping process. The performance characteristics of the non-sintered aggregate bricks were studied against relevant building material standards，and compared with three control samples and two commercial bricks. The compressive strength，mass loss rate by 55 freezing-thawing cycles and 28 salt-frost cycles times frost of waterproofing and wrapped-shell aggregate bricks were 9.15 MPa，4.32% ，1.67% and 12.11 MPa，2.42% ，0.87% ，respectively. The experimental results indicate that taking into consideration of the comprehensive performance，both aggregate bricks are better than the control samples，and almost as good as the commercial bricks. The wrapped-shell aggregate brick is better than waterproofing aggregate brick，and reducing the interface area of concrete-sediment can effectively improve the strength of non-sintered building materials.

Key words：dredged sediment；wet process；interface；non-sintered aggregate；pozzolanic reaction

随着我国工业化进程以及疏浚工程的不断推进，我国年疏浚量已逾 10 亿 m^3. 疏浚底泥呈流塑状，承载力差，直接利用困难，需经脱水干化处理[1–2]，且疏浚底泥的堆积会造成环境二次污染[3–4]，因此疏浚底泥的资源化利用已成为亟待解决的问题. 此外，目前我国建材的需求量与日俱增，过度消耗碎石等矿产资源会将山体切割成峭壁，严重影响生态环境[5–6]，由此，国家于 2000—2013 年发布多项政策鼓励使用固体废弃物作为绿色建材[7]. 疏浚底泥作为绿色建材制备路面砖，可同时解决疏浚底泥安置和矿产资源消耗这两个方面的困扰.

目前，国内外将疏浚底泥制备成路面砖采用直接

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