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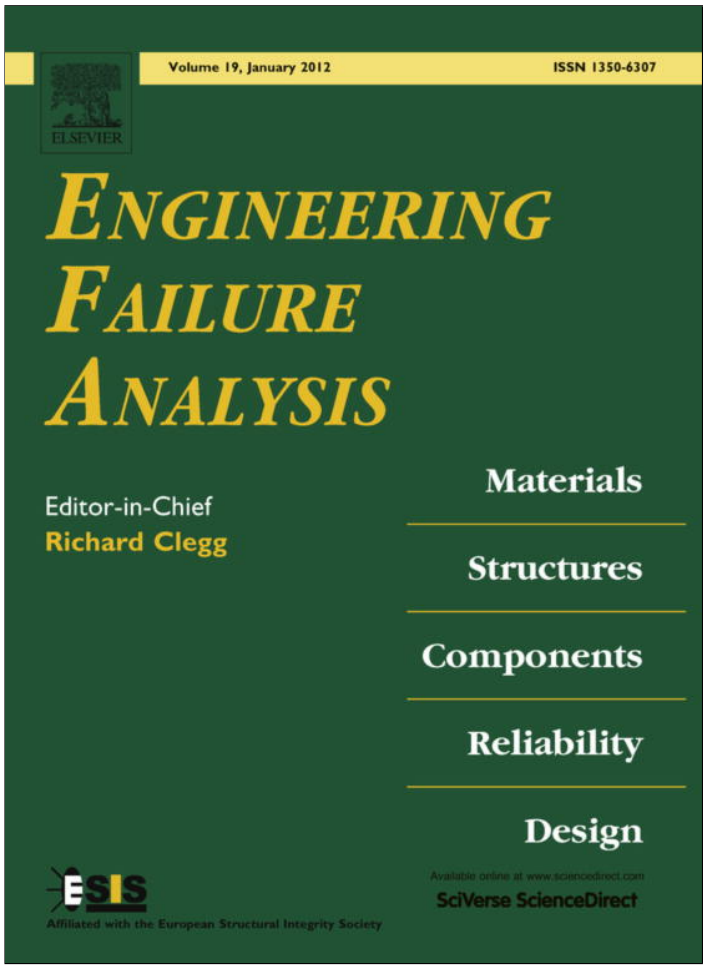

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Effect of salt crystallization ageing on the compressive behavior of sandstone blocks in historical buildings

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ABSTRACT

Sandstone building stones are important in the building elements of Portuguese monuments, particularly in the western and southern regions. Alveolization due to salt crystallization was the most important degradation pattern found in the old sandstone façades of buildings in the village of Atouguia da Baleia. Because weathering progressively increases porosity in stones, experimental research was conducted on the most porous variety of sandstone, which is similar to the type of stones found in the façades of ancient buildings in that village. An automatic salt crystallization accelerated ageing chamber was developed. Monotonic and cyclic uniaxial compressive tests were carried out on samples after sodium chloride crystallization ageing tests had been performed, in order to assess the compressive mechanical behavior of sandstone during accelerated ageing. The results of stress–strain compression diagrams showed a clear decreasing trend in the values of mechanical parameters during the salt crystallization ageing progress. The difference in compressive strength values between monotonic and cyclic compression also decreases with as salt crystallization ageing progresses. A predictive equation that correlates the compressive strength of sandstones with salt crystallization ageing cycles is proposed.

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