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Determination of weathering degree of the Persepolis stone under laboratory and natural conditions using fuzzy inference system

Mojtaba Heidari [a,*], Mehdi Torabi-Kaveh [a], Carlos Chastre [b], Marco Ludovico-Marques [c], Hassan Mohseni [a], Hossein Akefi [d]

[a] Department of Geology, Faculty of Sciences, Bu-Ali Sina University, Mahdieh Ave., 65175-38695 Hamedan, Iran
[b] CEris, ICIST, Department of Civil Engineering, Faculdade de Ciências e Tecnologia, Universidade NOVA de Lisboa, Caparica, Portugal
[c] CICC, Barreiro School of Technology, Polytechnic Institute of Setúbal, Portugal
[d] Department of Industrial Engineering, Faculty of Engineering, Bu-Ali Sina University, Mahdieh Ave., 65175-38695 Hamedan, Iran

HIGHLIGHTS

- A new approach was presented to qualitatively predict the stone weathering degree.
- Fuzzy models were employed to determine the weathering degrees of the stone.
- The predicted weathering degree was modified based on local climatic information.
- The modified weathering degree was compared with actual weathering in Persepolis.
- Based on the comparison the approach is reliable to quantify weathering degree.

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ABSTRACT

Weathering imposes vital effects on stony monuments. Mostly, the degree of weathering is determined by simple test results, ignoring simultaneous effects of various weathering factors. Hence, the main purpose of this study is to develop prediction models with fuzzy inference systems to determine the weathering degree of the Persepolis stone, using various accelerated ageing tests in laboratory condition and to extrapolate the results to the natural condition, considering climatic information. The results suggest reliable conformity between the prediction of the weathering degree of the stone and the weathering degree observed in the Persepolis complex in natural condition.