Drying of salt contaminated building sandstones: from experiments to numerical modelling

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ABSTRACT

Environmental conditions are one of the most important factors that lead to the deterioration of salt contaminated stones or masonry materials. In particular, when environmental conditions such as humidity, exposure to rain or rising damp vary, salts in contact with water (liquid or vapour) can dissolve and cause damage to the material by crystallization upon drying.

In this paper this challenging coupled problem is modelled improving the multiphase model developed in [1, 2]. The model - fully coupled, highly non-linear and time dependent - is referred to a Representative Elementary Volume, and takes as primary variables the relative humidity, the temperature, the mass fraction of the dissolved salt and the concentration of precipitated salt.

This tool is used to simulate experiments [3] in which sodium chloride contaminated sandstones, put in contact with liquid water and water vapour until complete saturation, are dried at different humidities.

The good agreement with experimental evidences proves the effectiveness of the proposed model.

REFERENCES

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