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FINITE ELEMENT SIMULATION OF CHEMO-MECHANICAL COUPLING IN BONDED GEOMATERIALS

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Summary. *This paper describes a solution strategy to model the transport of a dilute solute into a porous material, the subsequent reactions, the evolution of material degradation and the mechanical response of the solid in terms of inelastic strains. The convection-diffusion reaction equation is splitted in a pure advection system of PDEs solved using a Characteristic-Galerkin discretization technique and a system of ordinary differential equations solved with a fourth-order Runge-Kutta algorithm. The constants defining the velocity of the chemical reaction, in this case, the corrosion of CaCO3 under acid action, are determined with experimental tests. The constitutive model used to represent the debonding process has been developed by Nova Castellanza and implemented in the Finite Element program GEHOMadrid. The experimental response obtained in carbonatic soft rock specimens using a "weathering test device" is reproduced using the proposed strategy.*

1 INTRODUCTION

2 ADVECTIVE-DISPERSIVE TRANSPORT OF CONTAMINANT

3 TRANSPORT WITH CHEMICAL REACTION

4 NUMERICAL SIMULATION OF AN OEDOMETRIC TRIAXIAL TEST WITH CHEMICAL DEBONDING

5 CONCLUSIONS

6 AKNOWLEDGEMENTS

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