Effect of Mechanical Damage, and Temperature, on Transfer Properties (Permeability and Chloride Diffusivity) of Concrete Structures: Some Experimental and Numerical Studies

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Abstract

This presentation is the result of the work of a team and not of one person (for reasons of space, I will not name all the researchers who contributed). It relates to "coupled transfers in concrete". Two indicators of durability are studied. In the first part, we present works dealing with the permeability of concrete. This parameter is used to characterize the ability of porous media to carry gases or water, it is of great importance for predicting the durability and waterproofing of concrete structures. We will study the influence of mechanical and thermal loading on the evolution of this indicator both for low mechanical damage rates and high damage rates (location and opening of cracks). In the second part, it is the coefficient of chloride diffusion or migration under an electric field that is discussed. This indicator makes it possible to control the penetration of aggressive agents into concrete, and in particular that of chlorides. The chloride are partly responsible for the corrosion of the reinforcements and therefore for the durability of these structures. Also in this part, we study the influence of mechanical damage and temperature on this coefficient. All the results are presented and discussed.