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Effect of Water Saturation on the Nonlinear Elastic Response of Concrete

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Nonlinear interaction of a monochromatic elastic wave with a low frequency should be a good tool for non-destructive evaluation of existing concrete structures. This technique has already proved efficient in detecting global damage. However, it is necessary to understand the influence of some structural parameters as porosity, stress state, or water saturation on the nonlinear processes. In this way, a thermodynamically based model containing all of them is presented in this paper. It is sustained by nonlinear interaction measurements in order to quantify the evolution of the nonlinear behaviour of concrete with water saturation state.