Proton NMR Relaxation Characterization of Hydrates

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Objectives:
This research investigates the early hydration of cement hydrates by Nuclear Magnetic Resonance (NMR) relaxometry and the interpretation of Fast Field Cycling NMR profiles in cements according to the 3t model.

NMR Relaxometry for Hydrates

Proton NMR relaxometry is a robust technique for characterizing cement pastes throughout the acquisition and analysis of relaxation curves. The application of this technique provides a number of components, which can be associated to different pore families, characterizing the microstructures that evolved during hardening.

Investigating at Early Hydration

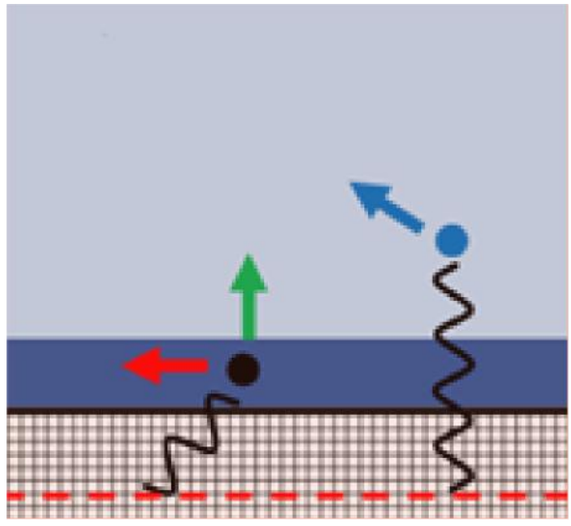
During the early times of hydration, the chemical and microstructural changes within cement pastes are not well understood. A work published by Holly et al. highlights the presence of a temporary NMR relaxation component at early hydration correlated with ettringite decomposition. This research works to re-investigate this component in relation to cement paste microstructure and porosity.

The 3t model and GUI

The parameters of the 3t model give robust information on the behavior of molecular fluids, spins motion, and diffusion within porous media.
A coding script with a graphical user interface (GUI) increases the efficiency of modelling and allows for a better visualization of results.

How is the NMR signal decay analyzed?

Different NMR pulse sequences are used in order to quantify the transversal relaxation times (T2) and the longitudinal relaxation time (T1). Short, long, liquid and solid components in the relaxation time distribution can be found after the inversion analysis of the decaying signal.
The signal decay is analyzed by discreet distribution and quasi continuous distribution. Both methods are applied to increase the robustness of the results.



For further information please refer to the following link: https://www.erica-etn.eu/
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