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Title: Controlling concrete curing through real-time acoustic emission behavior

Acoustic Emission (AE) monitoring is very promising for the understanding of processes in fresh cement and concrete. The aim of this proposal is, to utilize the AE behavior received during the curing of the material, in an effort to improve final mechanical properties and at the same time use the recorded data to make projections towards the final quality of the hardened medium. Processes like hydration, thermal expansion, early-age cracking, which are responsible for or influence the final strength and stiffness, emit detectable stress waves during the fresh state. Therefore, the non-invasive and sensitive nature of AE monitoring in conjunction with detailed displacement measurements by visual techniques like digital image correlation establish an excellent platform to study the material but most importantly to control the curing during the phase of hydration exploiting real time information. This project opens the gateway to a new era for construction materials, as it will be the first time that AE is used to steer the curing, rather than just to interpret the AE activity relatively the ongoing processes. This obtains even higher importance when considering modern admixtures like super absorbent polymers for internal curing or nano-reinforcement and the effort to control their behavior, to improve the material performance. Optimizing the mechanical properties of a given mix ensures long standing materials, contributing to sustainability of the built environment which is the driving force behind the research. VUB has strong tradition in the field of materials characterization, while collaboration with top national and international partners guarantees high quality feedback.

Supervisor: dimitrios.aggelis@vub.be; gerlinde.lefever@vub.be

Research Group: <https://researchportal.vub.be/en/organisations/mechanics-of-materials-and-constructions>

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