Spatial Damage Sensing Based on Multifunctional Cementitious Materials

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ABSTRACT

Concrete is susceptible to cracking and deterioration under service conditions and damage under extreme hazard events. Conventional structural health monitoring approaches mainly depend on point-based sensors that provide local measurements and cannot spatially locate or quantify damage such as cracking. To address this challenge, this work focuses on a new direct, spatial sensing approach based on multifunctional cementitious materials that are encoded with damage tolerance and damage self-sensing capacity. The tailored electromechanical behaviour of the material enables strain and damage sensing during elastic and post-cracking stages. Through advances in tomography methods, spatial mapping offering a visual depiction and quantification of damage in concrete members is achieved through boundary electrical probing.