

Impedance-based Crack Monitoring in Concrete Anchorage using Smart Piezoelectric Skin – Feasibility Study

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ABSTRACT

In this study, an impedance-based method for crack monitoring in concrete anchorage using a smart piezoelectric skin is proposed. Firstly, a concrete damage model based on the Ottosen failure criterion is selected to simulate plastic regions in the concrete anchorage. Secondly, a finite element (FE) model of the concrete anchorage is established to analyze crack formation induced by overloading cases. Thirdly, a prototype of a smart skin embedded with PZT sensors is proposed to predetermine sensitive frequency ranges for the impedance-based technique. Lastly, impedance responses measured via the smart PZT skin was numerically simulated before and after crack formation in concrete. The changes in impedance responses are statistically quantified using RMSD (root-mean-square-deviation) index to monitor concrete crack.

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