

Cyclic Crack Monitoring of a Reinforced Concrete Column under Simulated Pseudo-dynamic Loading Using Piezoceramic-based Smart Aggregates

Research Themes

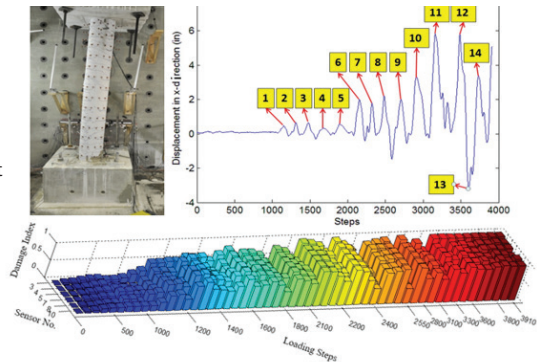
Real-time crack monitoring in concrete structure, especially the crack behavior under earthquake, is still a challenge. In this project, an active sensing approach using piezoceramic-based smart aggregates were developed into cyclic cracking monitoring. A reinforced concrete column under simulated pseudo-dynamic loading was investigated. Cracks inside the concrete, functioned as stress relief, attenuated the stress wave propagation energy between embedded smart aggregates. A wavelet packet-based structural damage index was developed to quantitatively monitor the cyclic crack behavior duo to the simulated pseudo-dynamic loading in real-time.

Recent Accomplishments

1. The loading test of the investigated concrete column was conducted in University of Illinois at Urbana-champaign (UIUC)
2. The smart aggregate based active sensing system was employed in the loading test
3. The experimental data was analyzed and the developed wavelet packet-based damage index was computed
4. Further analysis and discussion is still being conducted

Issues

1. Location identification of the internal cracks in concrete column using the proposed approach is still being studied.
2. The proposed active sensing approach with smart aggregates could be further developed into a wireless structure health monitoring system that poses many engineering challenges with future studies



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