World Academy of Science, Engineering and Technology
International Journal of Energy and Environmental Engineering
Vol:18, No:05, 2024

Evaluating Structural Crack Propagation Induced by Soundless Chemical Demolition Agent Using an Energy Release Rate Approach

Authors : Shyaka Eugene

Abstract : The efficient and safe demolition of structures is a critical challenge in civil engineering and construction. This study focuses on the development of optimal demolition strategies by investigating the crack propagation behavior in beams induced by soundless cracking agents. It is commonly used in controlled demolition and has gained prominence due to its non-explosive and environmentally friendly nature. This research employs a comprehensive experimental and computational approach to analyze the crack initiation, propagation, and eventual failure in beams subjected to soundless cracking agents. Experimental testing involves the application of various cracking agents under controlled conditions to understand their effects on the structural integrity of beams. High-resolution imaging and strain measurements are used to capture the crack propagation process. In parallel, numerical simulations are conducted using advanced finite element analysis (FEA) techniques to model crack propagation in beams, considering various parameters such as cracking agent composition, loading conditions, and beam properties. The FEA models are validated against experimental results, ensuring their accuracy in predicting crack propagation patterns. The findings of this study provide valuable insights into optimizing demolition strategies, allowing engineers and demolition experts to make informed decisions regarding the selection of cracking agents, their application techniques, and structural reinforcement methods. Ultimately, this research contributes to enhancing the safety, efficiency, and sustainability of demolition practices in the construction industry, reducing environmental impact and ensuring the protection of adjacent structures and the surrounding environment.

Keywords : expansion pressure, energy release rate, soundless chemical demolition agent, crack propagation
Conference Title : ICEFCBM 2024 : International Conference on Environment-Friendly Construction and Building Materials
Conference Location : Vancouver, Canada
Conference Dates : May 20-21, 2024