

Strengthening of Column Using Steel Fiber Reinforced Self-Compacting Concrete

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Abstract : The reinforced concrete members of old structures must be urgently restored and strengthened in order to prolong their service life. Opting for demolition or reconstruction is often impractical and time-consuming. Among the RC members responsible for bearing loads, compression members play a critical role in structural integrity. To increase the ability of existing structures to carry loads, engineers have been employing a variety of strengthening techniques. One promising method involves incorporating micro steel fibers into a cementitious composite. This approach yields high-strength cementitious composites that effectively reinforce existing structures. Specifically, the focus is on developing a self-compacting concrete composite reinforced with steel fibers, commonly known as SFRSCC. The key advantage of SFRSCC is its ability to minimize additional load imposed during application, thereby eliminating the need for time-consuming and cumbersome vibrators. This study's major objective is to examine how to produce a strong SFRSCC that is specifically designed for small-scale columns to increase such columns' load-carrying capability. Following the application of a strengthening layer of SFRSCC to these columns, their strength exhibited remarkable improvement compared to the reference concrete columns. Strength gains of 49%, 66%, 81%, and 89% were attained by the strengthening layers of 0.5" inches, 1" inches, 1.5" inches, and 2" inches respectively. The obtained results are highly encouraging, demonstrating the substantial enhancements in strength that can be achieved using SFRSCC. This SFRSCC concrete composite holds great potential for a wide range of strengthening and repair applications in various structures, presenting a cost-effective and efficient solution for enhancing structural performance and extending the service life of aging buildings.

Keywords : column, earth quake, FRSCC, strengthening techniques

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