

High performance fibre reinforced cement concrete slender structural walls

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Abstract. In the design of reinforced concrete structural walls, in order to ensure adequate inelastic displacement behaviour and to sustain deformation demands imposed by strong ground motions, special reinforcement is considered while designing. However, these would lead to severe reinforcement congestion and difficulties during construction. Addition of randomly distributed discrete fibres in concrete improves the flexural behaviour of structural elements because of its enhanced tensile properties and this leads to reduction in congestion. This paper deals with effect of addition of steel fibres on the behavior of high performance fibre reinforced cement concrete (HPFRCC) slender structural walls with the different volume fractions of steel fibres. The specimens were subjected to quasi static lateral reverse cyclic loading until failure. The high performance concrete (HPC) used was obtained based on the guidelines given in ACI 211.1 which was further modified by prof.Aitcin (1998). The volume fraction of the fibres used in this study varied from 0 to 1% with an increment of 0.5%. The results were analysed critically and appraised. The study indicates that the addition of steel fibres in the HPC structural walls enhances the first crack load, strength, initial stiffness and energy dissipation capacity.

Keywords: fibres; high performance concrete; slender structural wall; stiffness

1. Introduction

Considerable researches, as well as lessons learned from previous earthquakes, have led to improved understanding of the seismic behaviour of structural walls. Fintel (1991) indicated that properly designed shear walls could be used effectively as the primary lateral-load resisting system for both wind and earthquake loading in multistory buildings as they are efficient to provide lateral strength, stiffness and lateral drift control. Structural walls can be classified based on their overall height-to-length ratio known as the aspect ratio. Walls with an aspect ratio greater than two are usually referred to as slender structural walls and which exhibit flexural behaviour. Slender structural walls are quite common in tall buildings (Rangan 2008).

Review of literature indicates that numerous investigations were conducted in the past to study

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