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Effects of Core Concrete on the Buckling Behavior of Ultra-High Strength Reinforcement Bars

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1 Abstracts

The buckling of reinforcement bars, which may result in abrupt load-capacity degradation of reinforced concrete (RC) components, is definitely a critical issue in structures exposed to severe earthquakes. In the present study, six square RC columns were fabricated and tested under monotonic compression to investigate the influence of the core concrete on the buckling-resistant behavior of ultra-high strength reinforcement bars. All columns had a 150-mm square section and were 300 mm in height. The spacing of lateral hoops was selected as 50 mm (4*D*), 75 mm (6*D*), and 100 mm (8*D*), respectively. The experimental results indicated that the core concrete strongly affected the buckling of ultra-high strength reinforcement bars and should be carefully considered in the seismic design of RC components reinforced by the ultra-high strength bars.

Keywords: RC column; compression; slenderness ratio; bar buckling; ultra-high strength bar.

2 Introduction

Owing to their superior physical and mechanical properties, ultra-high strength (UHS) reinforcement bars (i.e., yield stress over 1000MPa) have been more and more widely adopted to the construction of high earthquake-resistant structures [1] and high resilient concrete columns [2]. The buckling of the reinforcement bars is a commonly reported failure mode in the reinforced concrete (RC) columns reinforced by the ordinary strength reinforcement bars and has been experimentally and theoretically studied by numerous researchers [3-7]. In the conventional RC columns that with inadequately spaced hoops, the buckling of the reinforcement

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