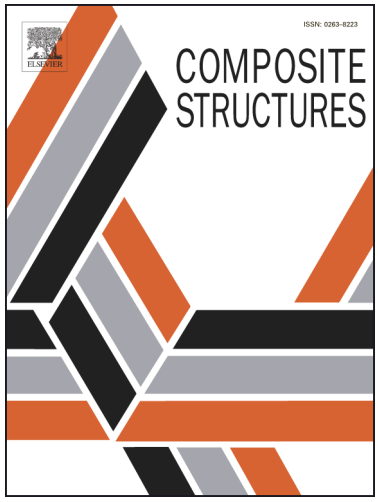


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# Experimental Study on Ultra-High Ductility Cementitious Composites Applied to Link Slabs for Jointless Bridge Decks

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**Abstract:** As a member in the engineered cementitious composites (ECC) family, ultra-high ductility cementitious composites (UHDCC) has the tensile strain capacity ranging from 6% to 12%. The present study aims to investigate the effect of UHDCC on the performance of link slabs for jointless bridge decks subjected to fatigue loading. To explore the fatigue durability of UHDCC, fatigue bending tests were carried out on six plain UHDCC beams at different stress levels. UHDCC exhibited multi-cracking, strain-hardening characteristics and satisfying fatigue durability at high load levels. A fitting equation was proposed to summarize the relation between stress level and fatigue life. Furthermore, three full-scale jointless bridge decks were tested to failure under fatigue loading. Two specimens made of steel reinforced UHDCC exhibited superior fatigue durability to that made of steel reinforced concrete, even if they experienced much larger deformation and steel strain. The test results indicated that the presence of UHDCC can effectively alleviate the strain fluctuation range of steel, reduce the input energy intensity, and improve the energy dissipation capacity of specimens, thus enhancing the fatigue life of steel bars. The findings above were demonstrated by a further analysis on the cumulative dissipated energy in the final part of the article.

**Keywords**: Engineered cementitious composites; Ultra-high ductility cementitious composites; Fatigue performance; Link slabs for jointless bridge decks

## 1. Introduction

Bridge structures have been playing an important role in traffic engineering all over the world. With the proactive fiscal policy in developing countries, the investment in traffic construction, especially bridge construction, has been

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