

Direct tension and fracture resistance curves of ultra high performance marine composite materials(PDF)

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Title: Direct tension and fracture resistance curves of ultra high performance marine composite materials

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摘要: Fracture behavior is one of the most important, yet still little understood properties of ultra-high performance cementitious composites (UHPCC), a new marine structural engineering material. Research on the fracture and direct tension behavior of UHPCC was carried out. The constitution law of UHPCC was divided into three phases: pre-partial debonding, partial debonding, and pullout phases. A direct tension constitution law was constructed based on the proposed fiber reinforcing parameter as a function of fiber volume fraction, fiber diameter and length, and fiber bonding strength. With the definition of linear crack shape, the energy release rate of UHPCC was derived and the R-curve equation was calculated from this. Loading tests of UHPCC using a three-point bending beam with an initial notch were carried out. The predictions from the proposed R-curve were in good agreement with the test results, indicating that the proposed R-curve accurately describes the fracture resistance of UHPCC. Introduction of a fiber reinforcement parameter bridges the fracture property R-curve and micro-composites mechanics parameters together. This has laid the foundation for further research into fracture properties based on micro-mechanics. The proposed tension constitution law and R-curve can be references for future UHPCC fracture evaluation.

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备注/Memo: Center of Concrete Corea, Korea Development and Application of High Performance and Multi-Function Concrete

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