Finite element analysis and experimental verification of Polymer reinforced CRC improved for close-in detonation

Compact Reinforced Composite, CRC, is a high-strength cement-based composite that holds an enormous flexural and energy-absorbing capacity due to the close-spaced high strength steel reinforcement and a high-strength cement-based fiber DSP matrix. The material has been used in various constructions, including as protection for explosion hazards. In connection with explosive impact, the fraction of shear reinforcement needed to obtain full flexural capacity is controlled by the stand-off distance. For close-in detonations, a high fraction of shock reinforcement is needed to obtain full flexural capacity without breaching. This paper introduces an efficient method for implementing high fractions of polymer shock reinforcement in a CRC element. Experimental tests and explicit finite element analysis is used to demonstrate the potentials of this material. This paper also provides the reader with the information and data needed to formulate a simple material model for High-Strength Fiber-Reinforced Concrete suitable for predicting the responses of Polymer reinforced CRC under close-in detonations using the general purpose transient dynamic finite element program LS-DYNA.

General information
State: Published
Organisations: Section for Structural Engineering, Department of Civil Engineering, University of Melbourne
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Publication date: 2007
Peer-reviewed: Yes

Publication Information
Journal: International Journal of Impact Engineering
ISSN (Print): 0734-743X
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 3.94 SJR 2.124 SNIP 2.898
Web of Science (2017): Impact factor 3.344
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 3.3 SJR 1.515 SNIP 2.167
Web of Science (2016): Impact factor 2.938
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 3.37 SJR 1.697 SNIP 2.943
Web of Science (2015): Impact factor 2.646
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 3.07 SJR 1.954 SNIP 3.57
Web of Science (2014): Impact factor 2.201
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 2.98 SJR 2.167 SNIP 3.614
Web of Science (2013): Impact factor 2.01
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 2.48 SJR 1.676 SNIP 3.621
Web of Science (2012): Impact factor 1.681
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 2.44 SJR 1.552 SNIP 3.083
Web of Science (2011): Impact factor 1.701
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.373 SNIP 2.394
Web of Science (2010): Impact factor 1.522
BFI (2009): BFI-level 1