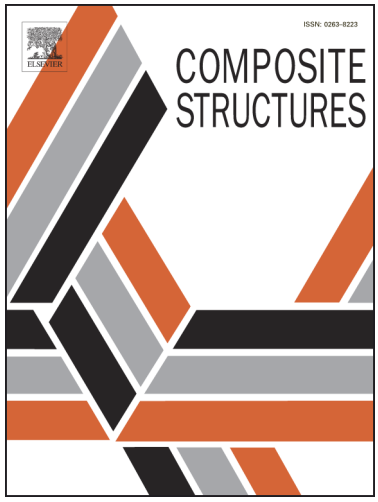

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Failure mechanisms of CFRP-wrapped protective concrete arches under static and blast loadings: Experimental research

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Abstract: In this research, failure mechanisms of carbon fiber reinforced polymer (CFRP) wrapped protective arches under static and blast loadings were investigated through experiments. Adopting bonding and partially-wrapping scheme, the plain concrete (PLC) arch is strengthened and its load carrying ability achieves the level of steel bar reinforced concrete (RC) arch in the static loading experiment. Adopting bonding and fully-wrapping scheme, it's akin to apply hollow CFRP tubular arch to reinforce plain PLC arches. Load carrying capacity of the CFRP composite arch achieves twice as much as that of the RC arch and the composite arch fails in a shear mode. Subjected to explosive loading, anti-blast ability of the CFRP tubular concrete arch is much better than the PLC arch. Critical scaled distance to prevent the arch from dynamic broken is considerably reduced. According to the research, it is confirmed that using the composite technique an efficient composite protective arch