Reinforced concrete T-beams externally prestressed with unbonded carbon fiber-reinforced polymer tendons - DTU Orbit (16/12/2018)

This study describes a series of experiments examining the behavior of seven beams prestressed with unbonded external carbon fiber-reinforced polymer (CFRP) tendons anchored using a newly developed anchorage and post-tensioning system. The effects of varying the initial tendon depth, prestressing force, and the presence of a deviator were investigated. The results were compared to those observed with analogous beams prestressed with steel tendons, common beam theory, and predictions made using an analytical model adapted from the literature. It was found that steel and CFRP tendons had very similar effects on the structural behavior of the strengthened beams; the minor differences that were observed are attributed to the difference between the modulus of elasticity of the CFRP and the steel used in the tests. The models predicted the beams’ load-bearing behavior accurately but were less effective at predicting the stress experienced by the tendons.

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