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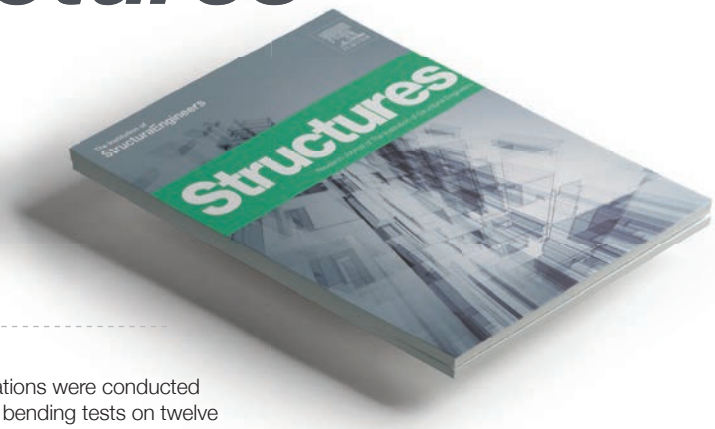

Editor's Featured Article

Associate Editor, Lei Wang, has selected a paper on non-destructive strengthening techniques for stone beams as the Featured Article for Volume 81 of *Structures*.

This article is available to read free of charge.

Non-destructive solutions for the strengthening of stone beams with CFRP and high-strength steel strand FRCM systems: Experimental and analytical investigation

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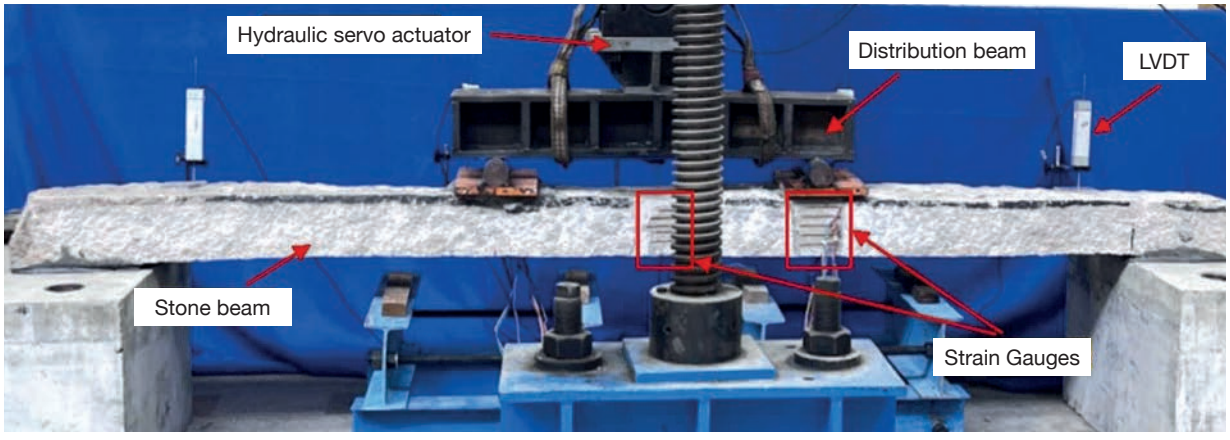
This study investigates non-destructive strengthening techniques for stone beams using fibre-reinforced cementitious matrix (FRCM) systems combined with carbon fibre-reinforced polymer (CFRP) meshes and high-strength steel strand (HSS) sheets. Experimental evaluations were conducted through three-point bending tests on twelve full-scale specimens, including unreinforced, CFRP mesh-reinforced and HSS sheet-reinforced stone beams. An innovative five-phase constitutive model was developed for reinforced and non-reinforced stone beams under flexural loading to accurately capture the progressive load-deflection response, with three distinct failure patterns proposed based on post-cracking structural behaviour. Theoretical formulas incorporating a damage-induced reduction factor were developed to predict cracking moments of stone beams, showing good agreement with experimental results. A cost-benefit metric was also introduced to evaluate the efficiency of different reinforcement strategies. Key findings revealed in this study include: (1) Unreinforced stone beams exhibit sufficient inherent flexural strength, confirming that the strengthening of stone beams should primarily target brittleness mitigation rather than load-bearing capacity enhancement; (2) Although the strengthening techniques provided modest improvements in cracking load, they successfully converted catastrophic brittle failures into non-brittle progressive failure modes, enabling post-cracked beams to maintain crucial deformation capacity, energy dissipation, and residual load-bearing reserves – significantly enhancing structural safety; (3) The FRCM-based reinforcement with G1200-type HSS sheets offers the most economically beneficial strengthening solution for stone beams. The research work advances the understanding of stone beam reinforcement while presenting practical methodologies for preserving historical structures and enhancing modern stone constructions.

→| Read the full paper at **https://doi.org/10.1016/j.istruc.2025.110168**



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