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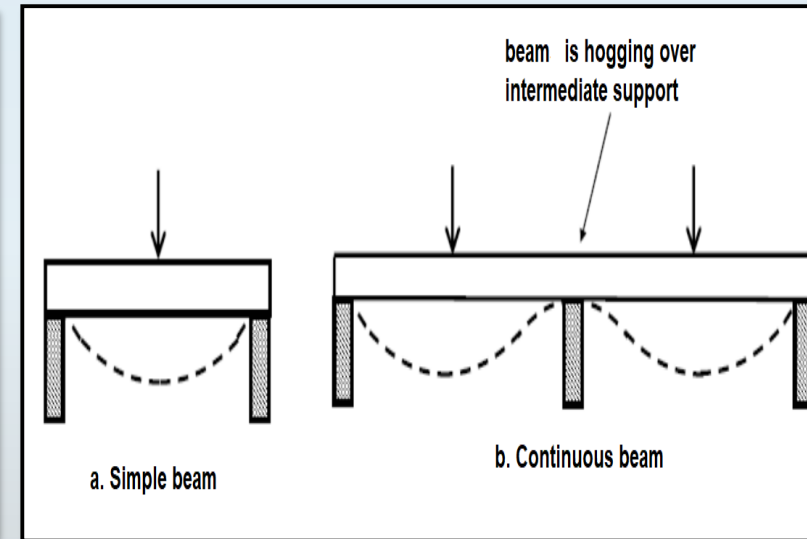
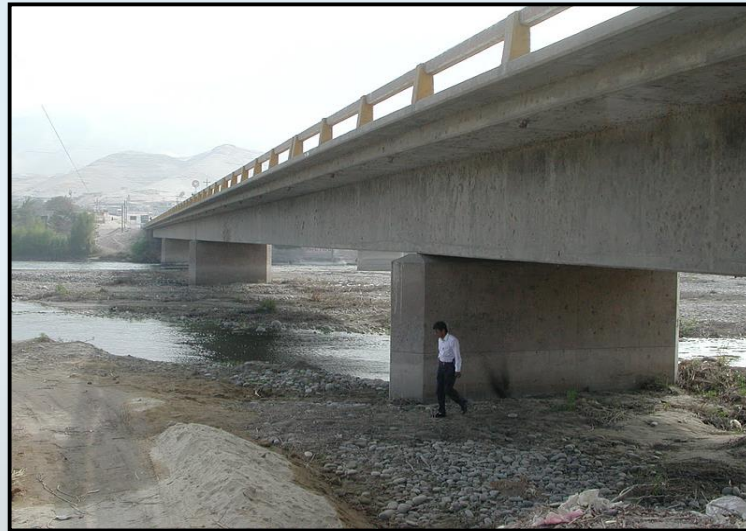
Flexural Behaviour of Continuous Hybrid Reinforced Concrete T-Beams

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Outline

- Research Questions.**
- Research Contribution.**
- Aim and Objectives.**
- Experimental Programme.**
- Test Results.**
- Conclusions.**

What are the reasons behind choosing continuous beams??



What are the reasons for choosing hybrid-reinforcements??

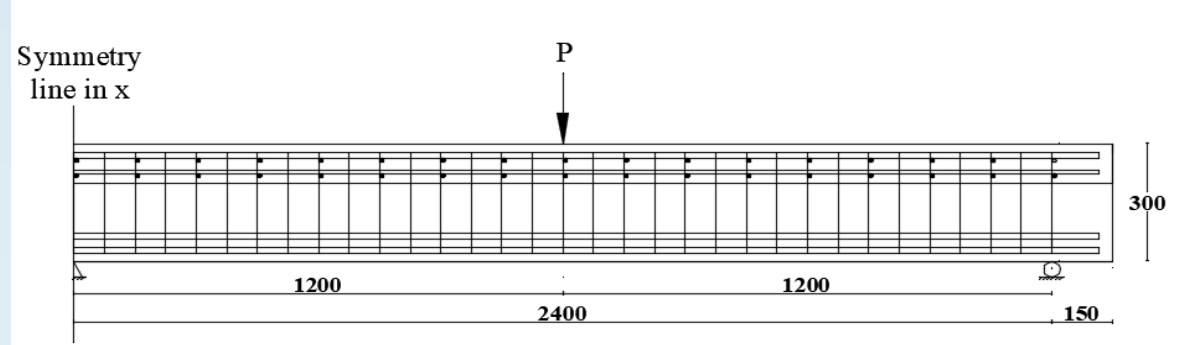
As none of the previous work in the literature has been done to examine the structural behaviour of continuous HRCT-beams, which is different from the behaviour of rectangular beams due to the effect of flange part, and different from the behaviour of simply supported beams due to the existence of hogging moment. This study aims to examine the behaviour of HRCT-beams experimentally.

Aim and Objectives

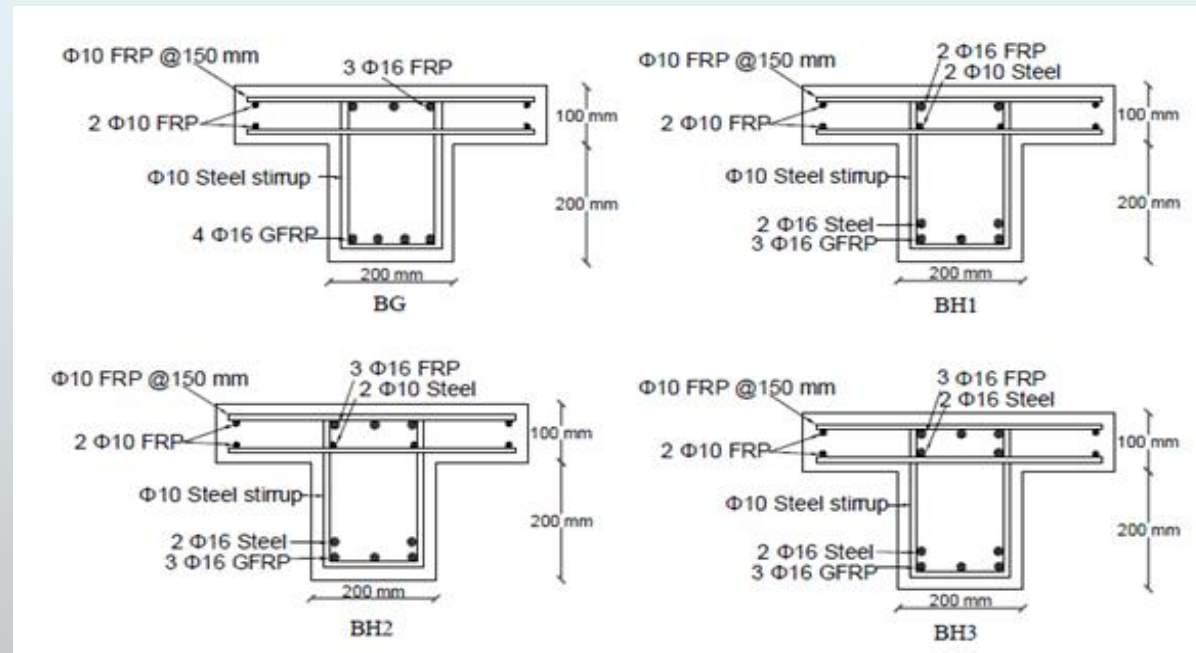
Examine the flexural behaviour of continuous hybrid reinforced concrete T-beams.



Four continuous supported T- beams has been constructed and tested.



Longitudinal reinforcement details



Cross-section reinforcement details

Preparing the Tested Beams



1. Framework preparation.



2. Preparation of the reinforcement cages.



a. Pouring



b. Vibrating

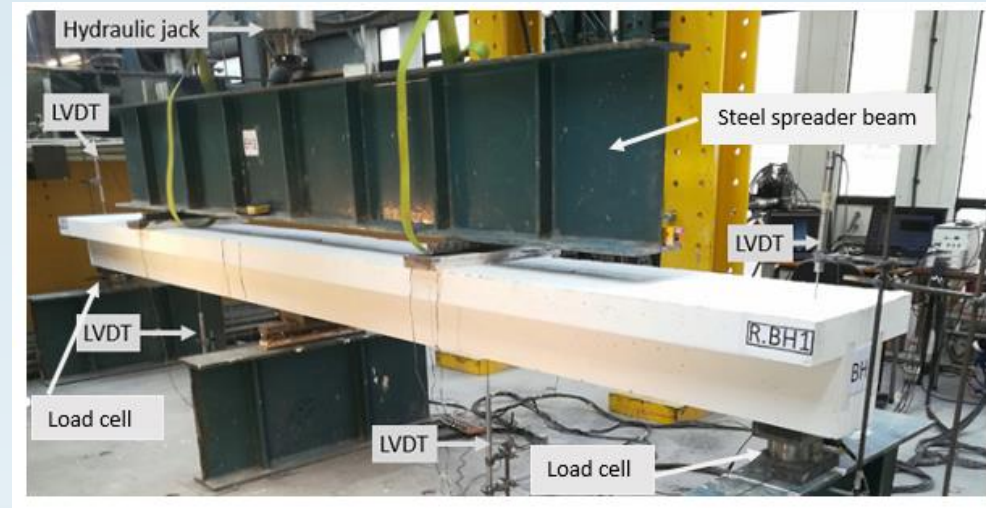


c. Levelling

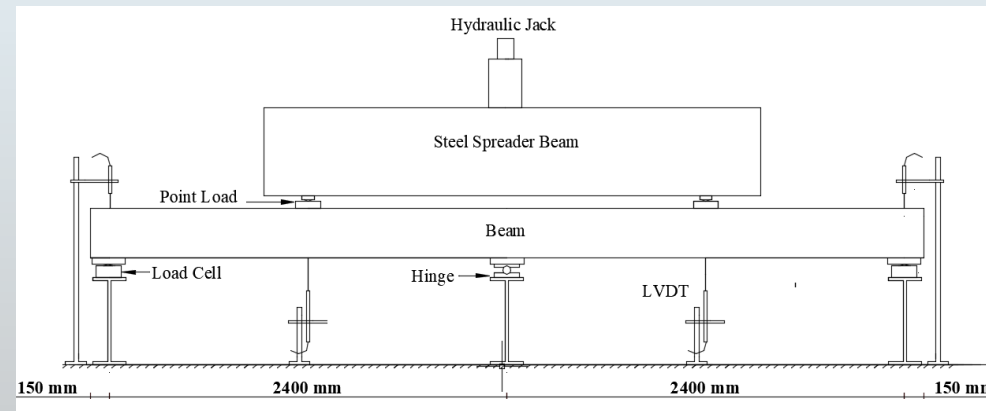


d. Curing

3. Casting process of the tested beams.

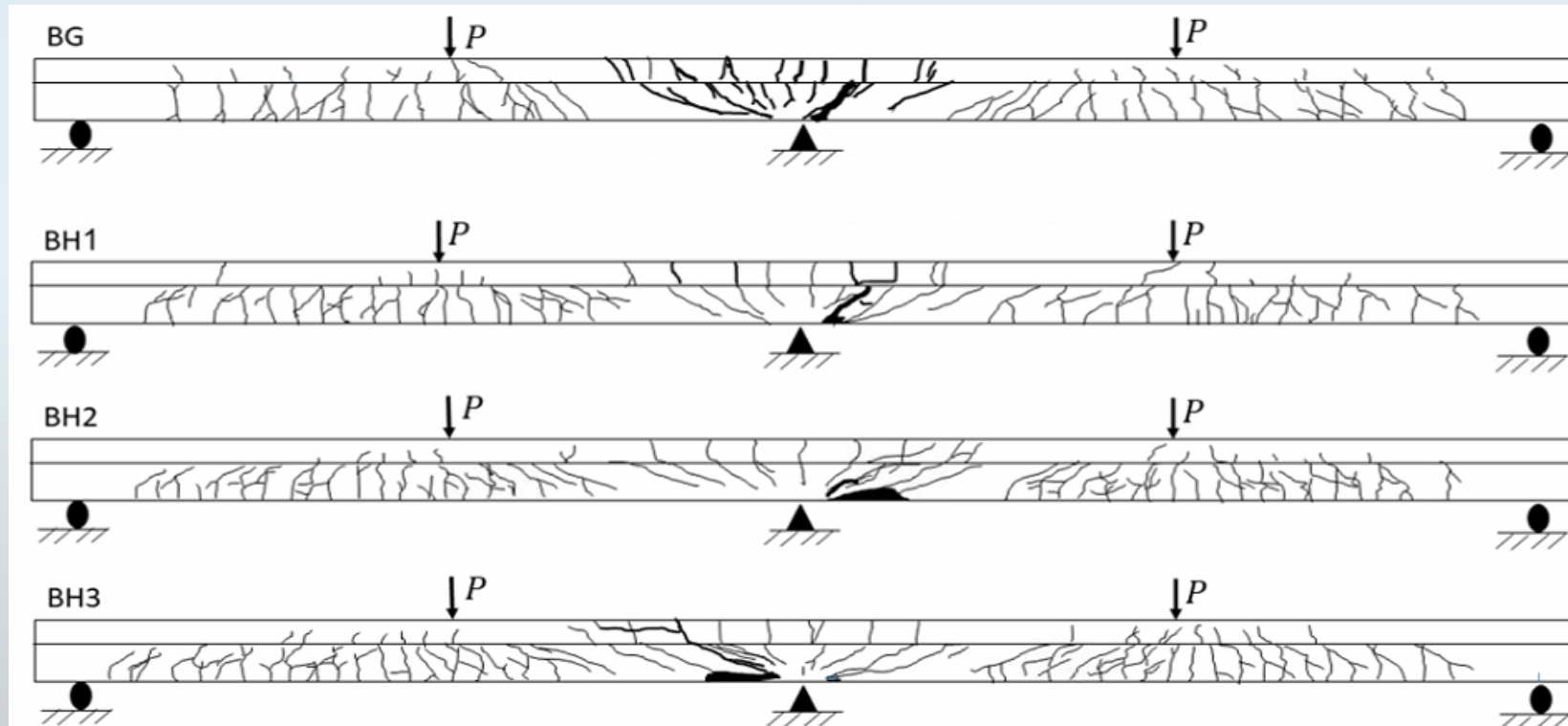


Actual test setup



Sketched test setup

- Crack Development

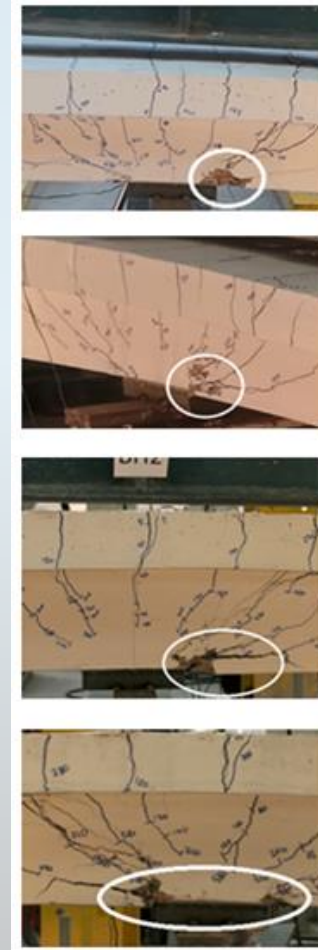


Cracks patterns for the tested beams

- Failure Modes



Deformation shape

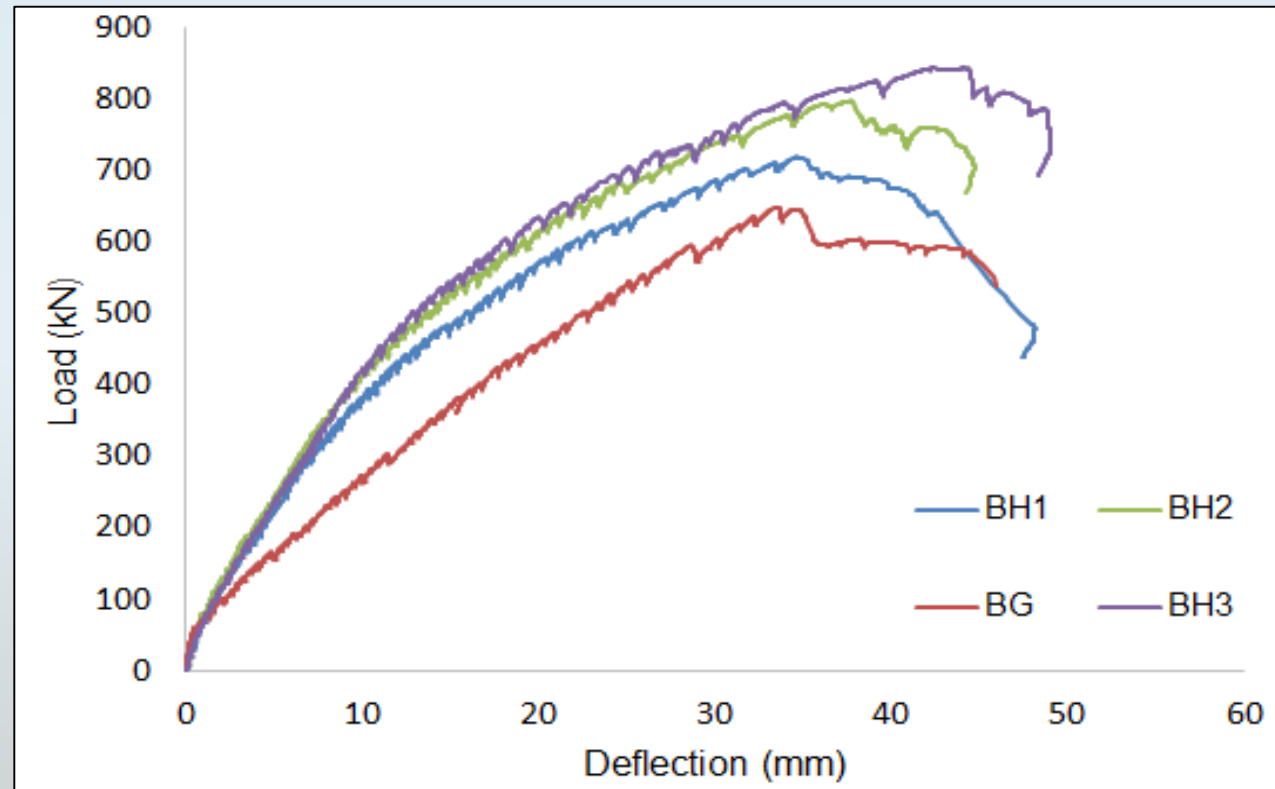


First failure



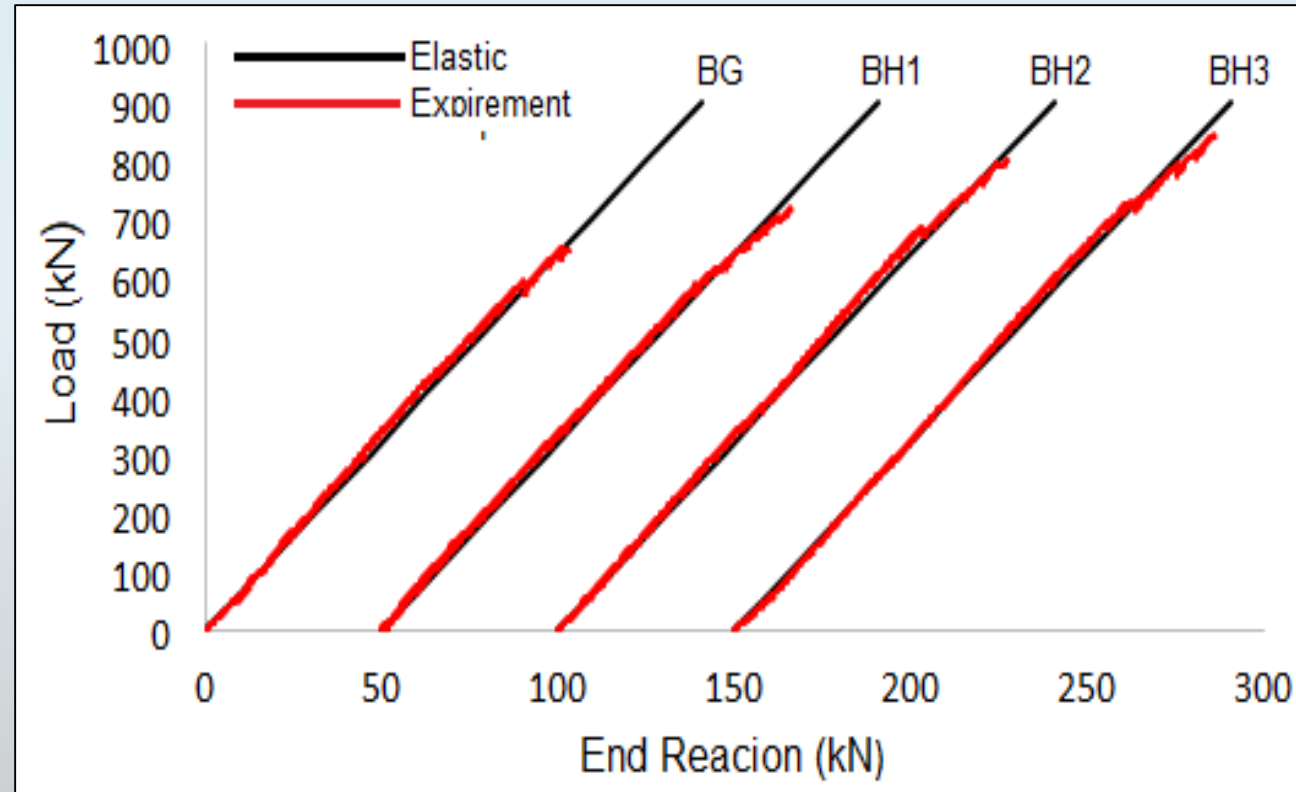
Observed mode of failure

Load deflection



Load-deflection curves for all beams.

Load capacity and Moment Redistribution



Load vs end reactions for the tested beams.

Conclusions

- Using a hybrid reinforced system consisting of steel and GFRP bars is a key solution to overcome the brittle behaviour of continuous GFRP-RCT beams. Yielding of steel in both hogging and sagging sections enhanced the ductility of beams compared to pure GFRP-RCT beams.
- Adding steel reinforcement to continuous GFRP-RCT beams enhances the ability of the beams to redistributed moments between its critical sections.
- Increase GFRP or steel reinforcement ratio in the middle-support section improves the load capacity of the section.
- Increase the GFRP reinforcement ratio in the middle-support section reduces the moment redistributing due to the reduction in ductility as the reinforcement increases.
- The low moment redistribution from hogging to sagging-moments section could be explained as a result of the early yielding of steel reinforcement. This means the formation of the plastic hinge at an early stage while the section can carry more loads.

Thank you for listening