

Uncertainty evaluation of reinforced concrete structures behavior

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ABSTRACT

When evaluating the behavior of reinforced concrete structures, as several bridges, we should take into consideration that the majority of parameters, like used materials and geometry, vary along the structure. This article presents a methodology, that takes this fact into consideration, and which purpose is to characterize, in a consistent way, if any reinforced concrete bridge presents a behavior within the expected one, or not. The methodology is divided on following steps: 1) Develop a calibrated deterministic numerical model; 2) Determine random distribution function for each input parameter; 3) Develop a non linear probabilistic analysis; 4) Calculate a liability index which relates, in a consistent way, the proximity of numerical and experimental data.

Two sets of laboratory tested beams, with different support conditions, simply supported in one batch (Figure 1) and mixed supported on the other (Figure 2), are firstly analyzed by this methodology (Matos *et al.*, 2008). Those beams were executed at same time, presenting different reinforcement typologies and concrete covering. Main conclusions of this first analysis are the applicability of purposed methodology (Figure 3 and 4) and the importance of gathering any data from analyzed reinforced concrete structures. The behavior of reinforced concrete bridges can be so evaluated through this methodology, presenting it, a great utility for their safety evaluation by detecting any abnormal behavior.

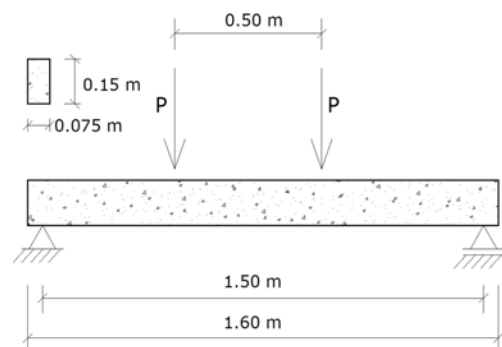


Figure 1 – Simply supported beam.

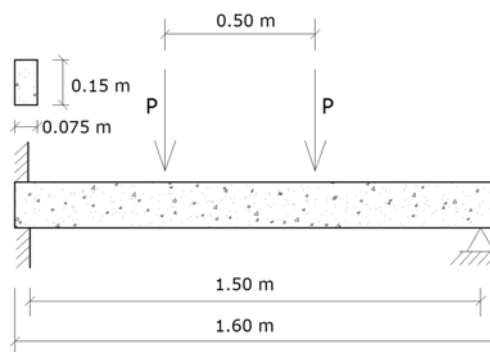


Figure 2 – Mixed supported beam.

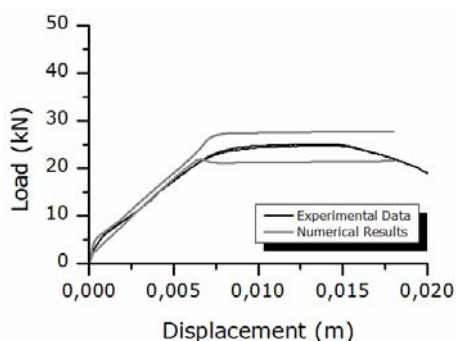


Figure 3 – Simply supported beam results.

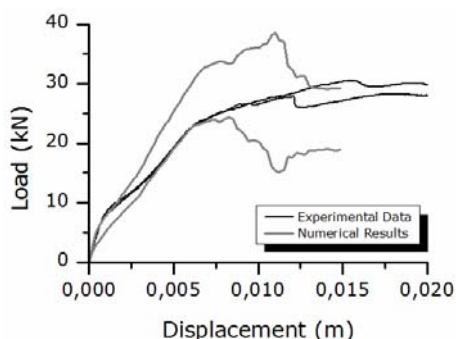


Figure 4 – Mixed supported beam results.

REFERENCES

- Matos, J.C., Valente, I. e Cruz, P. 2010. Avaliação de incertezas no comportamento até à rotura de vigas de betão armado, ASCP'09 – 1º Congresso de Segurança e Conservação de Pontes, ISBN 978-989-20-1559-0, Lisboa, pp. 5 - 12.