THE FLEXURAL, NON-LINEAR OSCILLATIONS OF NO-TENSION BEAM-COLUMNS

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In recent years the structural analysis of masonry buildings has prompted a great deal of interest. The static and dynamic behaviour of such structures is influenced by a large number of different parameters, such as the geometry and mechanical characteristics of their constituent materials. Such complexity notwithstanding, one distinctive feature of masonry is its different behaviour under tensile and compressive stresses. With the aim of accounting for this peculiar characteristic, constitutive laws have been successfully developed for and used in the static analysis [1,2] of no-tension (masonry-like) materials. More recently, the constitutive equations have been extended to dynamic analyses. Specifically, a numerical model has been developed to study the dynamic non-linear behaviour of slender, no-tension structures [3].

This work concerns the flexural, non-linear oscillations of rectangular cross-section piles, made of no-tension material, hinged at their ends and subjected to a constant axial load. A variational approach is proposed to explicitly obtain some approximate solutions using the averaged Lagrangian of the system [4,5]. The dynamic equilibrium of the beam is studied for some initial conditions as well as for the case of primary resonance of the first mode.

References

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Keywords: dynamics, no-tension materials, beam-columns