

DYNAMIC BEHAVIOUR OF GUYED TOWERS UNDER SEISMIC
EXCITATION

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SYNOPSIS

The paper is concerned with the analysis of some aspects of the non-linear dynamic behaviour of guyed towers. Namely, by the use of a computer program, described in a paper presented at the 5th ECEE, the influence of neglecting the mass of the cables and the comparison between the non-linear analysis and the use of linearized models are taken into consideration.

OUTLINE OF THE METHODOLOGY

In the recent years the Authors are carrying out a numerical-analytical research on the dynamic behaviour of guyed towers under seismic excitation. The first results were presented at the 5th ECEE and consisted in a computer program in which the complete set of differential equations governing the motion of such structures are integrated with respect to the time, after having been discretized with respect to the space, according to a finite-difference scheme. This approach can be considered as rigorous, at least within the limits of the numerical procedure utilized for the integration; nevertheless the computer time required looks to be of a certain economical effort while the engineering design practice is often based on simpler structural idealizations, whose usefulness in the dynamic range is still to be fully understood.

The present paper is just a move in this last direction as long, as the results obtained by the rigorous approach are used to test the validity of the usual assumptions.

The influence of neglecting the mass of the cables on the dynamic response is studied first, under the hypothesis of uncoupled longitudinal and transversal vibrations. An a priori bound for the error is also included in the analysis.

Furthermore an attempt is made, to still give a physical meaning to some qualitative properties of the dynamic behaviour (e.g. pseudo-natural nodes and pseudo-frequencies), in order to investigate the possibility of extrapolating to the non-linear range some of the results known for the linear one.