Abstract

Non linear and service to failure analysis of sections with evolutional construction working under flexocompresion state

Integral vision of a structure goes through recognize and to understand that this undergoes during his construction, life utility and dismantling changes in the conditions of entailment, configuration of section resistant, appearance of new loads and materials… All difficult it design and the analysis of the same one, moreover when the deferred phenomenon are considered that can undergo materials like concrete and the active steel like his nonlinearities. In this way, the correct study of the structures must include from its behaviour to early age to its ruin.

The service and failure analysis of the structures goes through the fulfilment of a series of recommendations gathered in the present codes sanctioned by the practice. In these are the models and bases of calculus necessary to approach the problem, however, in many cases the analysis must be simplified enormously to be able to materialize it. Consequently, some of the main phenomenon must be eluded and to use models that do not contemplate what really it happens and, therefore, must be gone to the use of safety factors for the fulfilment of the minimums requirements. However, in numerous occasions, this strategy does not lead to the optimums solutions from the economics point of view because these simplified models of calculus do not allow maximum yield of the material nor reflect the reality of a so complex problem. In these cases it is recommended to go to design schemes and sophisticated models directed to the use of computers and that contemplate to the problematical of trustworthy form ms to the reality. There are diverse alternatives: *Effective Modulus Adjusted to Age Method*, *j*'s *method*…, between these step by step methods are more general and those that are reserved for the problems of greater spread.

This thesis has been focused in the pointed line previously mentioned. The study has gone deep in this problem limiting to the fibre and sectional levels, leaving the structural level for works of greater spread. For that reason, the made important studies have been reviewed until this date, making in some cases comparisons to choose most appropriate in each situation. In order to approach the evolutionary analysis it has been decided to use a scheme based on method of the aging coefficient and on this aspect type has worked on a fibre – section design.

The models gathered in different referring verification of the service and failure states limit studies have been reviewed, extending the field of analysis until concrete of 100 MPa. In the same way, it has insisted on the failure analysis of high resistance columns, for which the jump of the covering phenomenon is known to divide certain levels of deformation according to the one of the used concrete.

Finally, all these considerations have been implemented in AESS (Evolutional Analysis of Symmetrical Sections), a nonlinear analysis program of simple, composed and mixed sections with configurations of materials and different forms written in MATLAB (MATrix LABoratory) code. The software contains the necessary modules for the verification of the service and failure limit states of the same ones, considering the deferred phenomena, the evolutional construction and the main nonlinearities of the materials to carry out these verifications. Its modular conception allows the extension and improves of the models chosen according to agrees, being taken care of future works carried out by other students or professionals familiarized with the program and them change of the future specifications of the present codes..