Some remarks on the preliminary report

II

Some Remarks on the Preliminary Report

Quelques remarques sur le rapport préliminaire

Einige Bemerkungen zum Vorbericht

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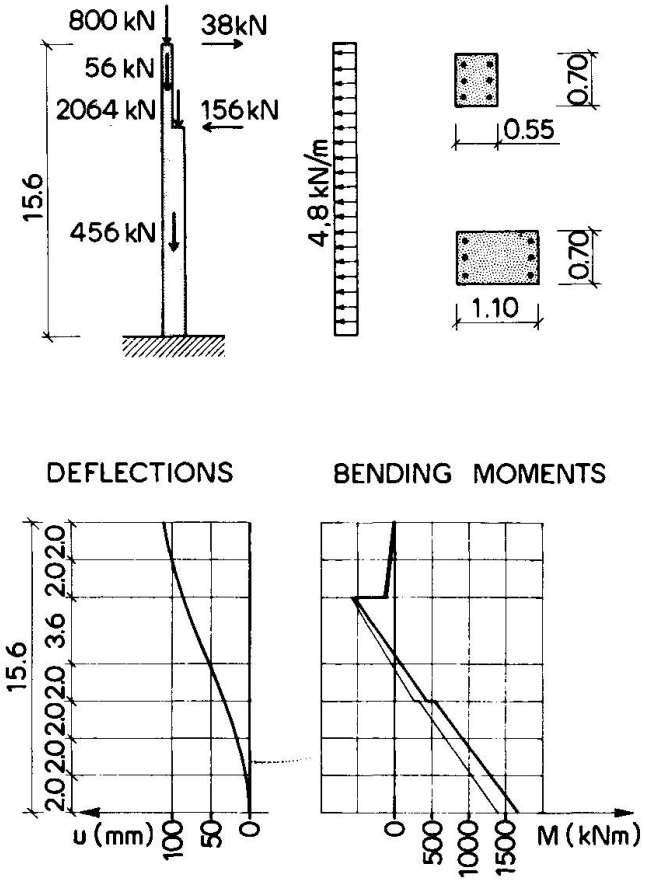
It is remarkable that several contributors to this section share the view of professor Oelhafen expressed in his concluding remarks: "sophisticated computer oriented incremental analysis procedures .... are therefore not suited to be used in common design practice". Even Menegotto and Pinto who in their paper have shown us a most interesting practical application of such a method hold the view that "use of tables, drafts or approximate formulae .... is sufficient for design needs" when ordinary columns in buildings are considered.

I do not quite share this point of view.

I believe that if one has developed a method of analysis which shows satisfactory results when compared with laboratory tests, it is worthwhile trying to maintain the main features of the method when simplifications have to be made for practical applications. In this case everybody seems to agree that a step - or iterative - procedure is one of the most accurate ways of predicting the behaviour of reinforced concrete columns subject to combined compression and bending.

The main features of this method is that the division of the column in discrete elements makes it possible to handle arbitrary loads and that the use of numerical integration in the calculation of curvature enable us to base the calculation of defelctions on cracked/non-cracked sections and the non-linear stress/strain relationship of the concrete. Why not then use this method directly and maintain these basic features in ordinary analysis and practical design of columns? As a matter of fact this is what we have done in our structural department for the last three years.

The computer programme which we have developed is very similar to the one described by Menegotto and Pinto and we also use a similar technique to improve the convergence. We have, however, made some simplifications and accepted limitations although we have



maintained the abovementioned main features of the method.

I can illustrate what the programme can do and what its limitations are by showing an example which quite often appears in our practice. (See fig.). It is able to handle statical determinate columns hinged at both ends or fixed fully or partially at one end. The columns may be loaded with any kind of distributed load or single forces acting in the plane of one of the principal axes. The cross sections must be solid and rectangular and only two different cross sections in the same column can be considered. In return the programme includes the possibility of dimensioning the main reinforcement.

The latter two limitations are purely introduced to simplify the programme and make it easier to use in dayly routine work. It is the intention to extend the programme to include biaxial bending and arbitrary and varying cross section. These extentions do not contain any fundamental problems with relation to the method. But a further extention to include also statical indeterminate structures do, so we are reading and listening with great interest to the news in that respect from our colleagues at universitites and research-laboratories.

Reference:
A. Hougaard Nielsen & Svend E. Petersen:
EDB-beregning af betonsøjler
(Computer calculation of concrete columns)
Nordisk Betong nr. 2, 1973.