

### Computer-aided optimum design of space trusses(\*)

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COMPUTER aided analysis in statics, dynamics and stability of structures has been commonly used for many years. This is thanks to the application of very powerful method of finite elements. Recently a growing interest has been observed in optimum structural design, particularly in minimum of structural weight.

Existing methods for minimum weight design are still far from common use. It may be seen from review papers which have recently appeared. Examples of structures showed there, which may be optimized applying optimality criteria method or mathematical programming techniques, give an idea of limited possibilities in this important field of engineering activity.

The main aim of the paper is to present a method of structural optimization which might easily be applied with the help of standard software for finite element method and use of a personal computer. In our particular case it is IBM-PC.

The proposed method is based on simultaneous solution of equations and inequalities arising from Kuhn-Tucker necessary conditions for an optimum problem. One of the most difficult problem arises in evaluation of Lagrange multipliers. This is caused by the fact

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that active constraints are known only at the end of the interaction process. For this reason an algorithm with one pivoting constraint at each iteration is proposed.

The paper is illustrated with several examples of minimum weight design of trusses. The efficiency of the proposed method is illustrated by a minimum weight design of a space truss with 364 nodes and six linking groups for structural members.

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