

# **THE ANALYSIS AND MINIMUM WEIGHT DESIGN OF DUCTILE STRUCTURES**

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## **Abstract**

The dissertation is concerned with the design and behaviour of plane ductile frameworks. The first six chapters examine the problem of assigning economical sections to frames which derive their strength from a bending action, and the last four chapters deal with triangulated frameworks. In the first section the theory of plastic collapse is used to predict failure. A geometrical model is used to clarify the nature of the problems and to prove five general theorems. A few methods of solution are suggested, and their relative merits are demonstrated by practical examples. The second section describes an experimental and theoretical study of the collapse behaviour of a stiff-jointed truss. A planned series of experiments is described, and the results are discussed. A numerical picture of the behaviour of these structures was obtained with the help of the electronic computer at the Mathematical Laboratory, Cambridge. The theory used assumed an idealised stress-strain relation for the material of the framework and assumed that plane sections remained plane. A reasonable agreement between experiment and theory was obtained.