Heinisuo, Markku, BICITERION APPROACH IN OPTIMIZING REINFORCED CONCRETE BEAM

The paper deals with the possibilities offered by the multicriterion optimization when designing the concrete beam. A numerical example where the cost functional is minimized and the stiffness of the beam is maximized is presented. The constraints are the yield condition in bending and the maximum width of the cracks at the lower surface of the beam. Also a proposal is presented where instead of the stiffness the maximum crack width is chosen as the other objective function. The design variables are the areas of reinforcing bars. The hierarchical optimization method, where at first is minimized the cost functional, seems to be suitable in the solution. The computer is needed when analyzing the reinforced concrete beam and when solving the optimization problem. In the paper the optimization problem is solved graphically by reducing the general problem.

Salonen, Eero-Matti, Aalto, Jukka, NODAL FORCES AND NODAL FLOWS

The theoretical background of the concepts of nodal force and nodal flow often employed in the finite element method in a rather intuitive way is explained. Especially the nodal force reaction and the nodal flow reaction concepts are introduced and their use in the determination of traction and stress components or normal flux and flux components is described. The nodal force concept is considered first and the obtained results are then empolyed through analogies in connection with the nodal flow one. Two simple numerical examples are given to illuminate the theory.