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Most Economical Design of Axially Loaded Columns

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Abstract : The main objective of this paper is to achieve an optimal design of the reinforced concrete columns. Optimization of columns results in saving in cost. The objective function is to minimize the total cost of the column. The objective function is taken as the cost per unit length of column consisting the cost of concrete, reinforcement, formwork and ties. In the formulation of the optimum design problem, the breadth, depth of the column, number and the diameter of reinforcement bars and diameter of lateral ties and their spacing were treated as design variables. The optimal design was carried out using MATLAB (The Mathworks, Inc.) software. Optimization problem was formulated as a Nonlinear constrained minimization problem. This was solved using fmincon SQP Algorithm. Many problems were formulated and the optimal solutions were obtained. It was found that the solutions give the most economical design.

Keywords : Columns, Constrained Nonlinear Minimization, Matlab, Nonlinear Programming Problem, Optimization, SQP Algorithm

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