



STRUCTURAL OPTIMISATION OF TRUSS STRUCTURE FOR DEVELOPMENT OF CENTER PIVOT IRRIGATION SYSTEMS IN PAKISTAN

Author(s): Muhammad Burhan Sharif¹, Usman Altaf², Muhammad Yousaf³

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Abstract:

This paper presents an interactive technique to optimise the shape and topology of three dimensional trusses. The presented study uses evolutionary solver and finite element analysis to evaluate the fitness function. The problem considered for this optimisation is a long span steel truss that serves as the main supporting system of a modern irrigation procedure (centre pivot irrigation system (CPIS)). The problem has been encoded in a graphical programming interface for achieving the discrete optimisation of this truss. The design space and node connectivity has been constrained so that the evolving truss topology is simplified. The objective function is to minimise the weight of truss while satisfying the strength and serviceability criteria. The routine generates several truss geometries within the discrete design space and the fitness of each shape is evaluated by integrating the routine with structural analysis software. Evolutionary solver has been employed to iterate the variables logically so that the optimum solution is obtained. Consequently, a simple cost effective solution for CPIS has been presented that can be easily fabricated in local environment.

For full paper, contact:

Prof Muhammad Masood Rafi

Editor-in-Chief, NED University Journal of Research

Ph: +92 (21) 99261261-8 Ext: 2413; Fax: +92 (21) 99261255

Email: NED-Journal@neduet.edu.pk

Website: <http://www.neduet.edu.pk/NED-Journal>

¹ Associate Professor, Department of Civil Engineering, University of Engineering and Technology, Lahore, Pakistan, Ph. +923214220871, Email: burhansharif@uet.edu.pk.

² Postgraduate student, Department of Civil Engineering, University of Engineering and Technology, Lahore, Pakistan, Ph. +923005072288, Email: usmanaltaf1@gmail.com.

³ Assistant Professor, Department of Civil Engineering, University of Engineering and Technology, Lahore, Pakistan, Ph. +923004997540, Email: myousaf@uet.edu.pk.