Optimization of Complex Geometry Using Tenth Order Partial Differential Equation

Kirmani, K. N. *, Jamil, R. N.

School of Science, Department of Mathematics, University of Management and Technology, Lahore, Pakistan

*khawar.kirmani@umt.edu.pk

Abstract

This paper presents an efficient and intuitive technique of shape parameterization for design optimization using a partial differential equation (PDE) of order ten. It shows how the choice of two introduced parameters can enable one to parameterize complex geometries. With the use of PDE based formulation, it is shown in this paper how the shape can be defined and manipulated on the basis of parameterization and the boundary value approaches by which complex shapes can be created. Further the boundary conditions which are used in it are a boundary and an intermediate curves for defining the shape. This technique allows complex shapes to be parameterized intuitively using a very small set of design parameters. Hence, Practical design optimization of problems becomes more achievable by applying PDE based approach of shape parameterization by incorporating standard numerical optimization techniques [1,2].

Keywords: PDE surfaces, smoothness, continuity, ten boundary curves