

Solving the Thermal Boundary Layer with Heat Flux Estimation Around An Elliptical Body

Mustafa B. Al-Hadithi

Abstract

The present work describes a method to solve the thermal boundary layer equations of unsteady incompressible three dimensional laminar fluid flows around an elliptical body. The partial differential energy equation was transformed into two systems of ordinary differential equations. The general form of energy equation solution was assumed with two different boundary conditions. Also, the velocity field solution was substituted in the energy equation, when the boundary value problem of partial energy equation was reconstructed to an initial value problem and then solved numerically. An analytical solution was presented to solve the problem based on Gauss error integral and Gamma function, it was found that the analysis is more complicated and time consuming. From the output results a qualitative estimation of heat flux about an elliptical body can be carried out.