

ABSTRACT

The present work concerns with the formulation of mathematical equations can be used to predict dimensionless groups (Sh , Nu , St , j_a , j_h , C_f), momentum, mass transfer coefficient and heat transfer coefficient. The work is applied to turbulent incompressible Newtonian flow system with cartesian coordinates and low mass transfer rates.

Reynolds stresses that appear in Navier - Stokes equations have been expressed by eddy viscosity concept (Zero - equation type). The Zero - equation models used in this work are developed by converting the two layer models to single layer models for simplicity. The sublayer factor (A) is taken in this case to be constant.

The technique has been developed further by taking the sublayer factor (A) to be Variable and function of Reynolds number. The new technique is named as variable sublayer Factor Technique (VSF). The formulated equations are then solved by numerical methods using the hybrid technique to overcome the expected wiggles or oscillations that may arise. The present work has been, extended further to be able to solve mass transfer problems. For this purpose a new expression for turbulent Schmidt number has been derived.

The present techniques have been tested with other models [29, 35], and with experimental data obtained from the same references. Present techniques show an improved