

5.1 Introduction

For plate orientations that lead to separated flow regions, the complexity of the flow pattern means that experimental measurements are difficult, so that numerical simulation must be performed. This chapter describes an experimental investigation along with CFD validation of the variation in local heat transfer coefficients over the surface of a rectangular plate located at varying orientations with respect to an oncoming air flow. The experimental data along with CFD results are compared together and a good agreement is found. Also, different correlations for heat transfer coefficient and Nusselt number are presented. A general correlation for variation of average Nusselt number as a function of (Re) and plate angles of inclinations are also presented with its verification. The friction factor is correlated from CFD results. The average heat transfer coefficient and average Nusselt number results for both experimental and CFD were validated with the corresponding previously published work.

5.2 Experimental and CFD results with uniform heat flux

The experimental and CFD cases are performed within the average of Re from $5.1 \times 10^4 \leq Re \leq 7.8 \times 10^5$ this correspond to the air average velocity between (4-20) m/s for experimental cases and from (4-32) m/s for CFD cases by increment of 4 m/s. The observation of the experimental and CFD parameters and results are given in tables (1-4) in appendix–C from which show the following: