TECHNOLOGICAL EDUCATION INSTITUTE OF
CENTRAL MACEDONIA
SCHOOL OF TECHNOLOGICAL APPLICATIONS
DEPARTMENT OF MECHANICAL ENGINEERING

Graduate Studies Program:

Academic Year 2014 - 15

"Renewable Energy Systems: Design, Development and Optimization"

Supervisor's Name : Dr. Vlahostergios Zinon

Subject:

PARAMETRIC STUDY OF HEAT EXCHANGER EFFICIENCY WITH THE USE OF COMPUTATIONAL FLUID DYNAMICS

Introduction & Motivation:

Heat Exchangers are devices that are used in a wide range of Mechanical Engineering applications and they are closely related to the development and optimization of Renewable Energy Systems. Maximizing the efficiency of a heat exchanger is a crucial task and a challenge for an engineer and has to do with many aspects regarding the geometrical characteristics and the flow field development inside the devise. A parametric study will be performed and aspects of the heat exchanger efficiency optimization will be investigated thoroughly.

Implementation & Means:

The current thesis deals with the parametric investigation and the impact of various flow parameters and geometrical characteristics of the heat exchanger on the heat exchanger efficiency. The actualization of this investigation will be made with the use of computational fluid dynamics (CFD). A commercial CFD software will be used for the design and the parametric investigation and the final results will be validated with empirical and experimental correlations found in the literature.

References:

[1] Matos R. S., Vargas J., Laursen T. A., and Saboya F., 2001, "Optimization study and heat transfer comparison of staggered circular and elliptic tubes in forced convection," International Journal of Heat and Mass Transfer, 44(20), pp. 3953– 3961.

[2] Khan W. A., Culham J. R., and Yovanovich M. M., 2006, "Convection heat transfer from tube banks in crossflow: Analytical approach," International Journal of Heat and Mass Transfer, 49(25-26), pp. 4831–4838.

Requirements: *Fluid Mechanics, Computational Fluid Mechanics, Heat Transfer*