

HEAT TRANSFER AND FLOW CHARACTERISTICS IN A GAS TURBINE CAN COMBUSTOR: TURBULENT INTERACTION

**By
Eng. Saad Ahmed Mohammed**

**A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the Requirements for the Degree of
MASTER OF SCIENCE
In
MECHANICAL POWER ENGINEERING**

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Key Words: Heat Transfer, Turbulent. CFD, Can Combustor, Swirl Number

Summary:

This thesis presents a numerical computation performed to investigate the convective heat transfer characteristics of a gas turbine can combustor under non-reacting flow conditions in a Reynolds number range between 50,000 and 600,000 with a characteristic swirl number of 0.7. In this thesis, a CFD package was used to predict the heat transfer and flow characteristics in combustion chamber. It is observed that the flow field in the combustor is characterized by an expanding swirling flow, which impinges on the liner wall close to the inlet of the combustor. The impinging shear layer is responsible for the peak location of heat transfer augmentation. It is observed that as Reynolds number increases from 50,000 to 600,000, the peak heat transfer augmentation ratio (compared with fully developed pipe flow) reduces from 10.5 to 2.7. Additionally, the peak location does not change with Reynolds number since the flow structure in the combustor is also a function of the swirl number.

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