Study of heat transfer in tubes

Abstract

Heat transfer coefficient is the major parameter which governs the heat transfer from the coolant flowing through the tubes or channels of a blanket and determines the temperature distribution. There are many correlations available in literature to study the effect of flow parameters on heat transfer coefficient. Calculating the heat transfer experimentally is challenging especially because of its dependence on no. of parameters like velocity, wall temperature, fluid temperature, heat flux through channels walls etc. and each of these needed to estimated accurately for better prediction. The project involves literature review and study of heat transfer coefficient in channels and its effect on flow parameters, channel size and shapes.
A forced convection experiment setup is available at IPR to carry out the experiments with heated channels size of 15- 20 mm hydraulic dia and with a flow rate to produce reynolds number in the range of 10000-30000 and Nusselt number from 30 -100. Experimentally obtained values may also be compared with analytical (with existing correlations) and numerical (ANSYS) analyses.

Work to be done at IPR

Week 1: Literature study on theory of heat transfer and its experimental calculations

Week 2 and 3: Experimental work on forced convection setup at IPR

Week 4 and 5: Numerical simulations using ANSYS

Work 6: Summarizing of outcomes and submission of short report.

Academic Project Requirements:

1) Required No. of student(s) for academic project: 1

2) Name of course with branch/discipline: B.E./B.Tech. Mechanical Engineering

3) Academic Project duration:

(a) Total academic project duration: 6 Weeks
(b) Student's presence at IPR for academic project work: 5 Full working Days per week

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