

# Simulation of Exhaust Gas Heat Recovery System for an Automobile

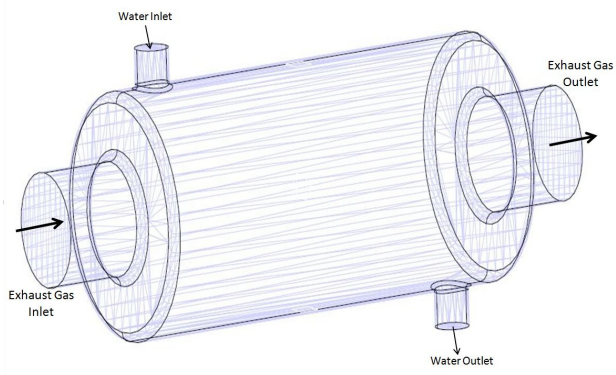
Anil Kumar Jaswal<sup>1</sup>, David Neihguk<sup>1</sup>, Abhinav Prasad<sup>1</sup>

<sup>1</sup>Mahindra Research Valley, Mahindra World City, Chennai, Tamil Nadu, India

## Abstract

This paper presents the simulation of exhaust gas heat recovery system for an automobile using COMSOL Multiphysics®. A double pipe heat exchanger is modeled in which the tube side medium is the hot exhaust gas and the shell side medium is water. The problem is divided into three parts i.e. Laminar flow in water regime, Turbulent flow in Hot exhaust gases and Heat Transfer in solids. Turbulent flow is solved using k- $\epsilon$  turbulence model. They are solved independently and the results are coupled subsequently. Different cases are run to validate the experimental data for different time steps. The Laminar flow problem and Turbulent flow problem are solved simultaneously taking the flow to be steady state in order to simplify the problem. Whereas, Heat Transfer in solids physics in COMSOL library is used to account for the time-dependent nature of the problem. For meshing, user controlled mesh is used and free tetrahedral meshing is implemented on all the domains. The results are found to be quite satisfactory and show a good correlation with the experimental data.

## Figures used in the abstract



**Figure 1**