

Theoretical and Numerical Analysis of Heat Transfer in Pipeline System

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Abstract

In this paper, analysis is conducted in both theoretical and numerical aspects on the heat transfer in a pipeline system via three steps: (1) Development of a theoretical model based on the heat transfer theory and existing work from literature; (2) Development of a corresponding MATLAB-based software for the evaluation of heat loss within the pipeline system; (3) Validation of the software via three-dimensional computational fluid dynamics (CFD) simulations using ANSYS FLUENT. It is concluded that the software can provide in-depth understanding of the heat transfer phenomena in pipelines and can be used for fast assessment of the heat loss in pipeline systems.

Keywords: Pipeline system; Software; Heat transfer.