



Energy Loss Investigation in Submarine Pipelines: Case Study of Cyprus Water Supply Project

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ABSTRACT

Submarine pipelines have become one of the popular ways of transboundary water supply. The hydraulic design of these pipelines is of significant technical challenges for engineers as it requires a comprehensive energy loss analysis. The major portion of energy loss in a submarine pipeline is created by friction losses. Besides, many fittings and connections in the pipeline cause significant minor losses. In this study, energy loss in the submarine Cyprus water supply pipeline, the longest offshore water supply pipeline in the world, was investigated. To this end, a MATLAB script was developed to calculate both friction and minor losses. The well-known total energy loss formulae, namely, Darcy-Weisbach, Hazen-Williams, Manning, and Chezy were used and the results were compared. Our calculations showed that the highest deviation is observed for the Hazen-Williams equation comparing to the Darcy-Weisbach equation. The energy loss values obtained by Manning and Chezy equations gave similar results with the Darcy-Weisbach equation. Moreover, it was found that the friction and minor losses are approximately 95% and 5% of the total energy loss, respectively.

Keywords:

Energy Loss, Head Loss, Friction Coefficients, Offshore Pipeline, Darcy-Weisbach, Cyprus Water Supply Project.