Optimization of gas transportation pipelines for capacity expansion

Mohammad Torkamanzadeh[1], Hossein Amani[2], Hasan Kariminezhad[3]

[1]Department of Chemical Engineering, Babol Noshirvani University of Technology, Babol, Iran

torkamanzadeh.m@gmail.com

Abstract

There is and always has been a need for a single text which explains simple equations and their applications in the natural gas flow. In this work, three types of pipeline arrangements including series, parallel and looped pipelines were reviewed and related equations were presented. Qualitative and quantitative comparison of each method were studied through an example and the results were interpreted. The effects of looped line on the increase of gas flow rate for various pipe diameter ratios were also investigated. It was observed that the benefit of looping increases exponentially with the fraction of looping. A 10-inch pipeline that is 20 miles long is exemplified in the text, and it was found out that the gas capacity expansion for this particular pipeline would be 20.36% for series, 294.83% for parallel and 21.95% for a looped combination, respectively.

Keywords: Pipeline, Optimization, Capacity, Series, Parallel, Looping

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[1] Senior Chemical Engineering Student

[2] Assistant Professor, PhD, Faculty of Chemical Engineering

[3] Assistant Professor, PhD, Faculty of Basic Sciences