

عنوان مقاله:

Modelling and Optimisation in the Design of Pipeline Network Systems using Ant Colony Optimisation Algorithm
(ACO)

محل انتشار:

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خلاصه مقاله:

This paper covers the Ant Colony Optimisation Algorithm (ACO) as an optimisation method and discusses and recommends the utilization of the model in design and analysing of varies parameters related in the oil and gas pipeline network systems. This is to achieve the optimum length of the pipeline, pressure and flow rate. Ant Colony Optimisation Algorithm (ACO) is capable of finding minimum path between several paths with their limitations and decreases pipe lengths from the sources to their destinations. It can be used in petroleum and gas refineries, transmissions and distributions lines. The theoretical and mathematical example of Ant Colony Optimisation Algorithm (ACO) between two places were carried and calculated. Optimum length is calculated about 100 cm with optimum pressure about 2440 psi and flow rate about 1.3×10^{-6} m³/h. An example was designed based on the random variables results from 10 to 96 km for MATLAB Software and 0.1 to 1 km for ANTCOL Software as Stochastic Variables (SV) of length (Km) between 14 stages which may show as 'SV-Matrix = Randi ([10 96], 14)' and Randi ([0.1 1.5], 14)'. For each iterations the SV matrixes are showed varies range of integrity. An example was assumed between 14 places with varies range of limitations which will be occurred during a pipeline project (FIG. 6 as an initially supposition graph) to find minimum path between stages to conclude optimum range of pressure and flow rate of oil and gases based on the optimum minimum paths of pipeline network systems. SV matrixes are used based on the MATLAB Code and ANTCOL software by the CPU core 2 Duo "Intel" based on the ACO algorithm formulas. The output lines, graphs and diagrams of ACO algorithm are showed the minimum optimum path between 14 stages about 526 km with start point from station 6 and optimum flow-rate 0.098106 m³/hr and pressure drop about 714.638 bar while 3.631 km as minimum length with optimum flow rate 1.51548×10^{-6} m³/hr and pressure drop about 1192.83 bar are found by ANTCAL results. The results proved the ability of ACO algorithm to find the optimum path with its effects on the other importance parameters, especially in the pipeline network systems, distribution and transmission lines and refineries.

کلمات کلیدی:

ACO, Ant Colony Optimisation Algorithm, MATLAB, ANTCOL

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