بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

سامية محمد مصطفى

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

سامية محمد مصطفى

شبكة المعلومات الجامعية

بعض الوثائق الأصلية تالفة

بالرسالة صفحات لم ترد بالأصل

Suez Canal University .
Faculty of Petroleum & Mining Engineering .
Department of Chemical & Petroleum Refining Engineering .

" NEW TREND FOR GAS PIPELINE NETWORKS DESIGN"

A Thesis Submitted to
Department of Chemical & Petroleum Refining Engineering.

in Partial Fulfillment of the Requirements
for the Award of the Doctor of Philosphy Degree
in
" Chemical & Petroleum Refining Engineering "

By
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B. Sc. (Eng.), 1985
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English Abstract

This work deals with the optimization application in the design and operation of gas pipeline systems through two common pipeline problems. The first is how to maximize the gas sales and the second is how to minimize the gas transport cost. A hypothetical gas network was used as an example of the first problem. In addition, three actual networks were used as examples of the second problem. Applying a new proposed procedure to reduce the possible combinations of gas fields and consumers, the obtained number of effective combinations constitutes about 35% of the number of possible combinations in most cases.

Key words	Natural Gas - Pipeline - Optimization - Combinations Reduction

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Nomenclature .

Letter	Description
A	pipe cross sectional area , m2.
C	gas consumer.
Cs	transport cost, L.E.
Cst	total transport cost, L.E.
d	internal diameter of pipe , m.
D	Day
Dc	Consumer Deviation from optimum conditions, %
Ds	Supply Deviation from optimum conditions, %
E	pipeline efficiency factor (fraction) .
f	Fanning friction factor .
1/f	transmission factor.
g	acceleration due to gravity , 9.81 m/s2.
G	specific gravity of flowing gas (for air =1) .
h	change in elevation , m.
L	length of pipeline , m.
m	mass flow , kg / hr .
M	thousand .
MM	million .
MW	molecular weight .
n	number of moles .
N	pipe node
P	pressure , k Pa.
P_1	inlet pressure , k Pa.
P_2	outlet pressure , k Pa .
$P_{2\,act.}$	actual outlet pressure , k Pa.
P_{2c}	end pressure by consumer, k Pa .
PF	Field outlet pressure pressure, k Pa
P_o	operating pressure , k Pa .
P_m	mean pressure , k Pa .
PN	pressure at node, k Pa
P_{pc}	pseudocritical pressure , k Pa.
P_{sc}	pressure of standard conditions , k Pa.
Q	flow rate of gas , cubic metre per day.
Q_{act}	Actual or measured value of flow rate of gas , MMscm/D .
QC	Consumer flow rate, MMscm/D
Q_{opt}	Optimum value of gas flow rate from, MMscm/D.

Letter	Description
QF	Field flow rate, MMscm/D
Q_{sc}	flow rate at T_{sc}, P_{sc}, MMscm/D
Qt	total flow rate of gas, MMscm/D
Qtx	maximum total flow rate of gas, MMscm/D
Qtn	minimum total flow rate of gas, MMscm/D
R	sales revenue, L.E.
Ri	individual sales revenue, L.E.
R_t	total sales revenue, L.E.
Re	Reynolds number , dimensionless .
S	pipe segment, m.
t	wall thickness of pipe, mm
T	absolute temperature of flowing gas , K .
T_1	gas inlet absolute temperature , K .
T_2	gas outlet absolute temperature , K .
T_m	arithmetic mean temperature , K , $T_m = ½ (T1+T2)$.
T_{PC}	pseudocritical temperature , K.
T_{Pr}	pseudoreduced temperature , K .
T_{sc}	temperature of standard conditions , K .
v	fluid velocity , m/s.
w	work , kJ .
Z_m	gas mean compressibility factor .

Greek Letters

Letter	Description
α	pipe angle to horizontal , degrees .
Δ	difference .
ε	absolute roughness , m.
μ	fluid viscosity , Pa.s .
π	ratio of circumference to diameter in circle , 3.14
ρ	fluid density , kg / m3.
Σ	sum