شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

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

بالرسالة صفحات لم ترد بالأصل

بعض الوثائق الأصلية تالفة

MENOUFIYA UNIVERSITY
FACULTY OF ENGINEERING
MECHANICAL POWER ENGINEERING DEPARTMENT
EGYPT

A THESIS ENTITLED

EFFECT OF BOOSTER PUMP SIZE AND LOCATION ON THE PERFORMANCE OF FLUID PIPE NETWORKS

PRESENTED BY

ENG.TAHER MOHAMED EL-KHODARY EL-SHIEKH
B.SC. IN MECHANICAL POWER ENGINEERING

For Partial Fulfillment of Master of Science Degree
in
Mechanical Power Engineering

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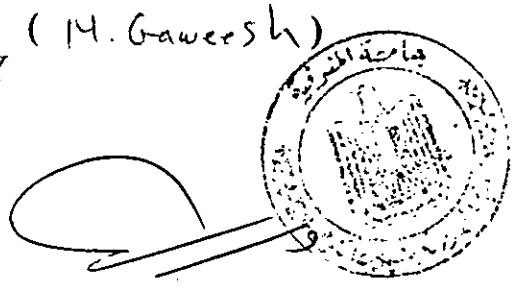

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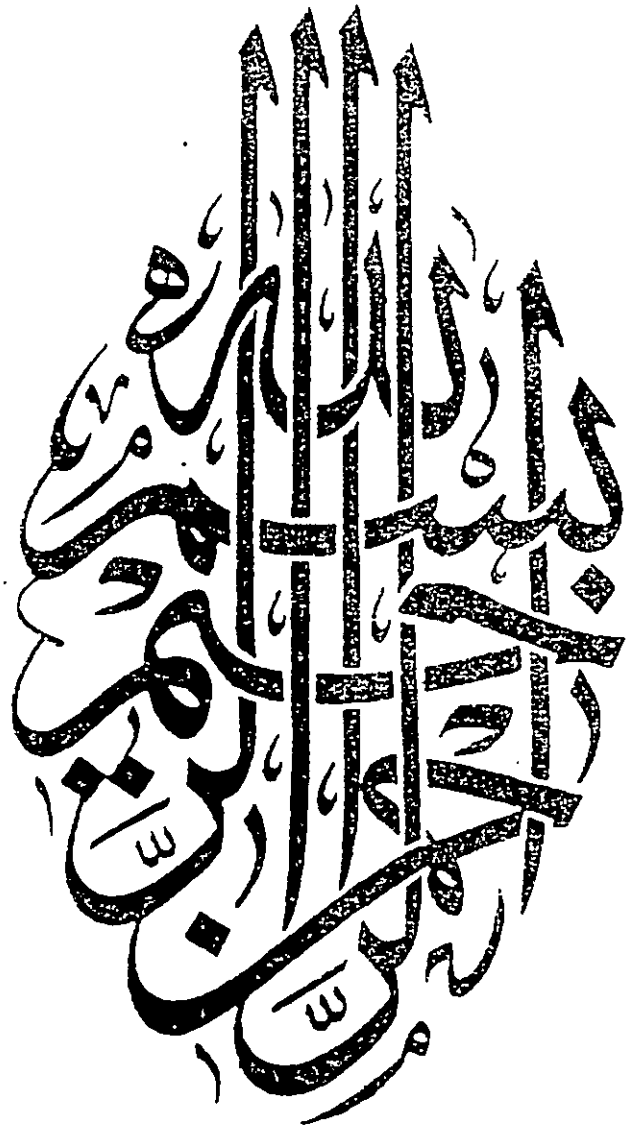

قَالُوا سُبحَانَكَ لا علم لَنا إلا مَا علمتَنا
إنكَ أنتَ العَلِيم الحَكِيم

صدق الله العظيم
البقرة ٣٢

STATEMENT

This thesis is submitted to the Department Of Mechanical Power Engineering, Faculty Of Engineering, Menoufiya University, for the award of the degree of M. SC.

Thesis title "EFFECT OF BOOSTER PUMP SIZE AND LOCATION ON THE PERFORMANCE OF FLUID PIPE NETWORKS"

The work included in this thesis has been carried out by the author in the department of Mechanical Power Engineering; Faculty Of Engineering; Menoufiya University; in cooperation with the Department Of Process Design and Development; Egyptian Petroleum Research Institute; Ministry Of Scientific Research. No part of this thesis has been submitted to any other University or Institute for the award of a degree or qualification.

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Date :

The above statement has been signed by the thesis author.

Supervisor ( ) Head of the Department ( )

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C O N T E N T S

NOMENCLATURE

The following symbols are used in this thesis:-

Symbol	Quantity	Units (SI)
A	Cross-sectional area	(m^2)
A_0	Shutoff head of the pump	(m)
C_{hw}	Hazen-Williams coefficient	(none)
C_L	The modified loss coefficient	(s^2/m^5)
d	Pipe diameter	(m)
e	Absolut roughness for pipe	(m)
e/d	Relative roughness	(none)
E_p	Energy added to the liquid by the pump	(m)
f	Friction factor	(none)
F	Number of fixed grade nodes	(none)
g	Gravity acceleration	(m/s^2)
h_L, h_{ij}	Head loss in pipe from i to j	(m)
H_i, H_j	The head at nodes i and j	(m)
J	Number of junction nodes	(none)
K, K_L, K_{ij}	The hydraulic losses coefficients	(none)
L	Pipe length	(m)
L_i	Number of loops	(none)
m	Maximum number of iterations	(none)
n	Exponential cofficient	(none)
nu	Number of nodes with given head	(none)
ni	Number of items in path through the network	(none)
N_i	Node number	(none)
P	Number of pipes	(none)
Q_i	Inflow to the node or the network	(m^3/s)
Q_o	Outflow from the node or network	(m^3/s)
Q_e	The external flow or demand	(m^3/s)

Symbol	Quantity	Units(SI)
Q_{ij}, q_i	Flow rate through pipe ij or i	(m^3/s)
Q_{0i}	The initially assumed flow rate	(m^3/s)
$\Delta Q, \Delta Q_L$	The corrective loop flow rate	(m^3/s)
ΔQ_t	Acceptable tolerance for correction flow rate	(m^3/s)
ΔQ_c	Calculated correction flow rate	(m^3/s)
R	Hydraulic radius	(m)
Re	Reynolds number	(none)
S	The slope of the energy line	(none)
V	Velocity of flow	(m/s)
$\vec{X}$	Vector in Newton-Raphson formula	(none)
$\vec{H}$	Vector in Newton-Raphson formula	(m)
$\vec{Z}$	Correction factor in Newton-Raphson form	(m^3/s)
$\vec{\Delta Q}$	Vector in Newton-Raphson formula	(m^3/s)
ν	Kinematic viscosity of fluid	(m^2/s)
μ	Viscosity of fluid	(kg/m.s)
ρ	Dinsity of fluid	(kg/m^3)