الاستهلال

بسم الله الرحمن الرحيم

قال تعالي

(وقل إعملوا فسيرى الله عملكم ورسوله والمؤمنون وستردون الى

عالم الغيب و الشهادة فينبئكم بما كنتم تعملون)

صدق الله العظيم

سورة التوبة الاية (105)

DEDICTION

Each challenging work needs to self-efforts as well as guidance of elders especially those who were very close to our heart.

My humble effort dedicates to my sweet and loving

MOTHER AND FATHER

Whose affection, love, encouragement and pry days nights make me to able to get such success and honor, Along with all hard working and respected teachers.

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ABSTRACT

The aim of this study is to develop a Boom motion model of the hydraulic system of an Excavator. Excavator hydraulic system components are modeled and analyzed in the same environment using the physical modeling toolboxes inside the commercially available simulation software MATLAB/Simulink interaction between the bodes and response of the hydraulic system are obtained by co-operating the hydraulic analyses variables such as pressure flow and displacement are measured on a physical machine and then compared with the simulation results.

Two simhydraulic model was found, boom raising in high speed and the other is the boom normal raising; boom normal lowering.

The compared between the required values and simulation results was found , the errors between the simulation results and real values was found and the maximum error in simulation result is 40% in cylinder pressure in Boom raising of high speed .

مستخلص

الهدف من هذه الدراسة هو نمذجة الحركه الهيدروليكيه للبوم فى الحفار وذلك بتحليل و نمذجة مكونات النظام الهيدروليكى فى نفس البيئه و ذلك بإستخدام النمذجة الفيزيائيه داخل برنامج المحاكاة. وعن طريق تشغيل النظام الهيدروليكى وذلك بعمل نمذجة لمكونات النظام الهيدروليكى تم الحصول على نتائج لمقياس الضغوطات ومعدلات السريان للمائع والازاحه للبوم. تم عمل نمذجة لكل حركات البوم من خلال مخطتين وهما الأول الرفع عند السرعه العاليه و الثانى السرعه الاعتياديه الرفع والنزول . كما تم مقارنة النتائج المتحصل عليها بواسطة النمذجة والقياسات الموجوده فى الكتب (الكتلوجات) وتم إستخراج النسبه المئويه للفرق (الخطأ) بين القياسين وكانت أعلى نسبة هى نسبة الضغط فى الاسطوانه وتساوى 40% وهى فى حالة الرفع عند السرعه العاليه.

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SYMBOLS:

Symbols	Description	Unit
A_{leak}	Closed valve leakage area	m^2
x	Control member displacement	m
x_{max}	Control member maximum stroke	m
Re_{cr}	Critical Reynolds number	$-$
C_D	Flow discharge coefficient	$-$
ρ	Fluid density	kg/m^3
μ	Fluid dynamic viscosity	$N.s/m$
v	Fluid kinematic viscosity	cSt
A_{max}	Fully open valve passage area	m^2
k_{HP}	Hagen-Poiseuille coefficient	$-$
$A(p)$	Instantaneous orifice passage area	m^2
p_A , p_B	Gauge pressures at the block terminals	kpa
P_P , P_T	Gauge pressures at the block terminals	kpa
k_{leak}	Leakage coefficient	$-$
q_{leak}	Leakage flow	m^3/s
p_{cr}	Minimum pressure for turbulent flow	kpa
ρ_{nom}	Nominal fluid density	kg/m^3
v_{nom}	Nominal fluid kinematic viscosity	cSt
ω	Pump angular velocity	rad/s
P	Pressure differential across the pump	kPa
q	Pump delivery	m^3/s
D	Pump instantaneous displacement	m
D_{max}	Pump maximum displacement	m
η_{mech}	Pump mechanical efficiency	$-$
ω_{nom}	Pump nominal angular velocity	rad/s
P_{nom}	Pump nominal pressure	kpa
η_V	Pump volumetric efficiency	$-$
p_{reg}	Regulation range	kpa
T	Torque at the pump driving shaft	$N.m$
D_H	Valve instantaneous hydraulic diameter	m
p_{max}	Valve pressure at maximum opening	kpa
p_{set}	Valve preset pressure	kpa

ABBREVIATIONS

P R V: PRESSURE RELEIF VALVE

D C V: DIRECTION CONTROL VALVE