# بسم اللّه الرحمن الرحيم

# شبكة المعلومات الجامعية

# التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

# جامعة عين شمس

## التوثيق الإلكتروني والميكروفيلم

# قسم

## نقسم باللّه 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

شبكة المعلومات الجامعية

# بعض الوثائق
# الأصلية تالفة

FACULTY OF ENG.

EL-MINIA UNIVERSITY, EGYPT

# SIMULATING OF A DIRECT CURRENT MACHINE BY ACTIVE CIRCUITS

A Thesis

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By


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*I would like to dedicate this work to my husband Ali, who provided a great deal of help and support Also, to my childern Reem, Mayar, Mohamed, and to my Father and Mother.*

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# NOMENCLATURE

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| Symbol | Description | Unit |
|---|---|---|
| b | Internal bias for a node | — |
| $B_m$ | Damping coefficient | N. m. s |
| $E_a$ | The armature electromotive force (emf) | volt |
| $i_a$ | Armature current | Amp |
| $i_{a_m}$ | Maximum armature current | Amp |
| $i_f$ | Field current | Amp |
| $i_{f_m}$ | Maximum field current | Amp |
| $i_{f_s}$ | Series field current | Amp |
| $i_s$ | Saturation current | Amp |
| $i_t$ | Terminal current | Amp |
| $I_a$ | Rated armature current | Amp |
| $I_f$ | Rated field current | Amp |
| J | Inertia of rotor | kg. m$^2$ |
| $k_v$ | Equal Ea/ωr or Te/i | V/rad/sec<br>N.m / Amp |
| $k_{v_m}$ | Max. value equal $L_{AF}\ i_{fm}$ | V/rad/sec |
| $L_{AA}$ | Self inductance of armature winding | H |
| $L_{AF}$ | Mutual inductance between field and rotating armature coils | H |

| | | |
|---|---|---|
| $L_{AF_s}$ | Mutual inductance between series field and armature winding | H |
| $L_{FF}$ | Self-inductance of field winding | H |
| $L_{FFs}$ | Self-inductance of series field winding | H |
| $L_{FS}$ | Mutual inductance between shunt and series | H |
| P | Operator d/dt (Differentiation) | |
| 1/P | Denote integration | |
| $r_a$ | Resistance of armature winding | ohm |
| $r_f$ | Resistance of field winding | ohm |
| $r_{fs}$ | Resistance of series field winding | ohm |
| $r_{fx}$ | Resistance connected in series with field winding represented field rheostat to adjust field current | ohm |
| $R_f$ | Equal $r_f+r_{fx}$ | ohm |
| R | Equal $r_a+r_{fs}$ | ohm |
| t | Real time | sec |
| Te | Electromagnetic torque | N.m |
| $T_L$ | Load torque | N.m |
| $v_a$ | Voltage of rotor winding | Volt |
| $v_f$ | Voltage of field winding | Volt |
| $v_{fs}$ | Voltage of series field winding | Volt |
| $v_t$ | Terminal voltage | Volt |