

الآية

قال تعالى : (وقل ربي زدني علما)

صدق الله العظيم

DEDICATION

Dedicated

To

My family

Who have always supported me in all my endeavors...

ACKNOWLEDGEMENT

Truly speaking I believe, that just a mere “thank I” don’t do proper justice to people contribution towards most of the endeavors. But usually, that remains the only thing I can offer, not just to acknowledge their efforts but also to pacify our consciences.

The most important thing I learn or try to learn over my life is how to think in simpler ways. I believe the man who epitomizes this process is my guide Dr. Nagm Aldin Abdo. I was amazed to watch him think from the very basic and sort out complicated issues in very logical ways.

I would also like to express gratitude to all staff of school of electrical and nuclear.

Abstract

In remote locations/rural areas where transmission cost is very high a self excited induction generator driven by micro-hydro turbine can be installed easily and economically.

To excite the generator, external reactive supply can be supplied from the grid or from the externally connected capacitor bank.

In this thesis, a two identical induction generators excited with symmetrical capacitor bank are use. The generators are driven by micro-hydro turbine. These induction generators supply a pure resistive load in isolated area.

PID controller is used to reduce the oscillation during the transient fault and also to improve the steady state response. The complete model is developed and simulated using MATLAB/Simulink software.

The simulation is carried out for steady-state and transient operation. The results are obtained and discussed.

المستخلص :

يستخدم نظام توليد الكهرباء باستخدام المولدات الحثية المثارة ذاتيا والمدارة بواسطة نظام التوربينات الهيدروليكية في المناطق المفصولة عن الشبكة القومية للكهرباء وذلك لمزاياه الاقتصادية. تتم اثاره المولدات الحثية اما بواسطة تغذيتها من الشبكة او بواسطة مكثفات خارجية.

في هذا البحث تم استخدام مولدين حثيين متماثلين تمت اثارتهما بواسطة مكثفات. هذه المولدات تمت ادارتها بواسطة توربينات هيدروليكية. تمت تغذية حمل مقاومي . تم استخدام متحكم تناسبي تكاملي تفاضلي (PID Controller) لتقليل التذبذب اثناء الاعطال العابرة, ايضا لتحسين الاستجابة في الحالة المستقرة. تم استخدام برنامج المحاكاة MATLAB/Simulink لمحاكاة النموذج المكتمل .

تم توضيح عمل المولدات الحثية اثناء الحالة المستقرة والحالة العابرة بواسطة المحاكاة. وتمت مناقشة ودراسة النتائج.

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List of symbol

SEIG	Self- Excited Induction Generator
V_{nom}	Rated voltage
I_{nom}	Rated Current
M	Mutual inductance
L_S	Self-inductance of stator
L_r	Self-inductance of rotor
Θ	Angular position between the rotor and stator
Θ_2	$\Theta - 2\pi/3$
Θ_3	$\Theta - 4\pi/3$
R_S	Resistance of the stator
R_r	Resistance of the rotor
ω_m	Mechanical angular speed
ω_s	Synchronous angular speed
J	Inertia moment
T_e	Electromagnetic torque
T_m	Mechanical torque
T_a	The constant time of servo motor
K_a	The gain of servo motor
g_{min} and g_{max}	Minimum and maximum of gate opining limits
R_p	The permanent droop
PID	proportional integral and derivative
K_p	Proportional gain of permanent droop
K_i	The integral gain
K_d	The derivative gain
P	d/dt

β	Damping coefficient
T_w	Water starting time
W_{ref}	Reference speed
P_{ref}	Reference mechanical power
P_0	Machine actual electrical power