بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

قسم

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To be Kept away from Dust in Dry Cool place of 15-25- c and relative humidity 20-40%

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الاصليــــة تالفــة

بالرسالة صفحات لم ترد
بالاصل

Zagazig University (Benha Branch)
Faculty of Engineering (Shoubra)
Electrical Engineering Department

Application of AI Techniques in Power System Modeling and Control

A Thesis Submitted to the Faculty of Engineering "Shoubra"
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ABSTARCT

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This work involves the study of two modifications to improve the dynamic performance of the well-established fuzzy logic based power system stabilizer (FLPSS). A novel fuzzy logic based power system stabilizer with supplementary signal controlled from the generator terminal voltage is presented, for the purpose of enhancing the stability margin of power systems. The suggested stabilizer is termed voltage-controlled fuzzy logic power system stabilizer (VCFLPSS). Also this work involves another modification over the fixed parameter FLPSS through tuning its parameters based on the deviation in the machine terminal voltage to be adaptive in damping enhancement as well as in improving the stability limits of multimachine power systems. The proposed controller is termed self-tuned fuzzy logic stabilizer (STFLPSS). The performance of the suggested controllers is studied through computer simulation for a multimachine power system model when undergoing both minor disturbance and large scale disturbance. A comparative study between FLPSS, VCFLPSS, and STFLPSS is presented to establish the effectiveness of the suggested controllers in damping out power system oscillations as well as in enhancing the power system stability limit.

NOMENCLATURE

Nomenclature

Parameters and variables through out this thesis have the following meanings

ω_r	Rotor speed
ω_s....................	Synchronous speed
ω_o	Steady state or base speed equal ω_s
v_a , v_b, v_c.............	Three phase voltages
i_a ,i_b, i_c	Three phase currents
i_{fd}, i_{kd}, i_{kq}	Field , d-damper, and q-damper winding currents
ψ_a ψ_b ψ_c	Three phase flux likages
x_{aa},x_{bb}, x_{cc}...........	The three phase winding self reactances
x_{ab}, x_{ac}.............	The mutual reactance between phase (a) and phase (b), and c
x_{afd}, x_{akd}, x_{akq}......	The mutual reactances between phase (a) and field, d-damper, and q-damper windings respectively
θ......................	The rotor position
N_3, N_2..............	The number of turns for the three phase and two phase windings respective
$T_{\alpha\beta o}$....................	The transformation matrix from three phase to two phase machine
T_{STR}	The transformation matrix from stationary to rotating axes
V_{BABC}	The base voltage in the three phase machine
V_{BDQ}	The base voltage in the two phase machine
I_{BABC}	The base current in the three phase machine
I_{BDQ}	The base current in the two phase machine
ψ_{BABC}................	The base flux linkage in the three phase machine
ψ_{BDQ}	The base flux linkage in the two phase machine
λ_d, λ_q	The direct and quadrature components of the flux linkages in p.u.
I_{BFD}, I_{BKD}, I_{BKD}	The base current in the field winding, d-damper, q-damper windings
Z_{BDQ}	The base impedance in the armature winding
P_e....................	Electromagnetic power
δ	The rotor angle
T_m	The mechanical torque input
T_{FW}..................	The friction and windage torque
M.....................	The inertia constant
V_d.....................	Armature d-axis terminal voltage
V_q....................	: Armature q-axis terminal voltage
I_d.....................	: Armature d-axis terminal current

I_q .... : Armature q-axis terminal current
V_f .... : Field winding terminal voltage
I_f .... : Field winding terminal current
I_{kd} .... : d-axis damper winding current
I_{kq} .... q-axis damper winding current
R_s .... Armature phase resistance
X_d .... d-axis armature phase reactance
X_q .... q-axis armature phase reactance
X_{md} .... d-axis mutual reactance
X_{mq} .... q-axis mutual reactance
R_f .... Field winding resistance
X_{fd} .... Field winding reactance
R_{kd} .... d-axis damper winding resistance
X_{kd} .... d-axis damper winding reactance
R_{kq} .... q-axis damper winding resistance
X_{kq} .... q-axis damper winding reactance
V_i, θ .... The busbar voltage magnitude and angle
P_L, Q_L .... The active and reactive power of the connected loads.
α_{ik} .... The angle of the impedance connecting bus i and bus k
δ_{COI} .... The rotor angle referred to the center of inertia
PFs .... The participation factors
PSS .... Power system stabilizer
U_{PSS} .... Output from PSS
CPSS .... Conventional power system stabilizer
MF .... The membership functions
FLC .... Fuzzy logic control
FLPSS .... Fuzzy logic power system stabilizer
ANN .... Artificial Neural Network
VCPSS .... Voltage controlled-Power System Stabilizer.
VCFLPSS .... Voltage-Controlled Fuzzy Power System Stabilizer
STFLPSS .... Self tuned fuzzy logic power system stabilizer
LOFs .... Low frequency oscillations

CONTENTS