

LIST OF ABBREVIATIONS

FLC	Fuzzy logic control
ANN	Artificial neural network
GA	Genetic algorithm
PSO	Particle swarm optimization
FLS	Fuzzy logic based system
FS	Fuzzy set
ABS	Anti-lock braking system
I/O	Input/output
PID	Proportional, integral and derivative
MIMO	Multiple inputs, multiple output
I/P	Input
O/P	Output
MF	Membership function
TRMS	Twin rotor multiple input multiple output system
pdf	Probability density function
LHS	Left hand side
RHS	Right hand side
PV	Photovoltaic
SOFM	Self-organizing fuzzy map
ISE	Integral square error
CLONALALG	Clonal selection algorithm
BPSO	Binary particle swarm optimization
SPEC	Supervised pseudo self-evolving cerebellar
Avg.	Average
DBSCAN	Density based spatial clustering of applications with noise
SD	Standard deviation
MOGA	Multiobjective genetic algorithm
MOPSO	Multiobjective particle swarm optimization
DC	Direct current
ITSE	Integral time-square error
IAE	Integral absolute error

ITAE	Integral time-absolute error
DPCS	Digital pendulum control system
DAQ	Data acquisition
PC	Personal computer
ZN	Zeigler-Nichols
Maglev	Magnetic levitation
PD	Proportional derivative
PI	Proportional integral error
dof	Degree of freedom

NOMENCLATURE

e	Error
\dot{e}	Rate of change of error
z	Fuzzy set zero
sp	Fuzzy set small positive
mp	Fuzzy set medium positive
lp	Fuzzy set large positive
sn	Fuzzy set small negative
mn	Fuzzy set medium negative
ln	Fuzzy set large negative
t_s	Settling time
M_p	Peak overshoot
Sec	Seconds
e_{ss}	Steady-state error
t_r	Rise time