Appendix A

Wind turbine emulator

A.1 Step-by-step process of DC-motor drive

1. The turbine power Vs rotor speed characteristics at different wind speed as per Eq. 4.1 is modelled in MATLAB SIMULINK.

2. Reference turbine torque signal has been generated at measured rotor speed of the DC-motor

3. Reference DC-motor armature current signal has been generated with respect to reference turbine torque signal.

4. DC-motor armature current is regulated at reference DC-motor armature current value using a DC-DC type-A chopper fed drive.

5. The signal conditioning of current error signal has been done in the dSPACE micro-processor board and conditined through a PI controller to generate PWM pulses for MOSFET switch in the chopper circuit.

6. The controller parameters are decided by hit and trial method.

A.2 WTE parameters

A.2.1 Design parameters of WTE

Table A.1 Design parameters of the emulated wind turbine.

Parameters	Value
C_1	0.15
C_2	116
C_3	0.5
C_4	1
C_5	4.7
C_6	17
r	0.7464 m

A.2.2 PI Controller Parameters

Table A.2 Controller parameters of DC-motor torque control.

K_p	K_i
0.5	25