EE6322D - STATIC VAR CONTROLLERS AND HARMONIC FILTERING – WINTER 2023-24

Assignment – 2

1. The rating of an FC-TCR unit is given as (-0.25 p. u., 1 p. u.). If the Thevenin impedance of the system is 0.1 p. u., design a controller with an objective to maintain the bus voltage at 1 p. u. Consider the phase margin to be (i) 45^0 and (ii) 60^0. Compare the two controllers in terms of the step responses. Step change must be given to reference voltage, reactive load current and the Thevenin voltage of the system.

2. The rating of a TSC-TCR unit is given as (-0.25 p. u., 1 p. u.). If the Thevenin impedance of the system is 0.1 p. u., design a controller with an objective to maintain the bus voltage at 1 p. u. Consider the phase margin to be (i) 45^0 and (ii) 60^0. Compare the two controllers in terms of the step responses. Step change must be given to reference voltage, reactive load current and the Thevenin voltage of the system.

3. Find the ratings of an SVC for a system with Thevenin voltage = [0.9 p. u., 1.5 p. u.] and the bus voltage must be regulated with in [0.95 p. u., 1.2 p. u.]. The Thevenin impedance is given to be 0.1 p. u. and the inductive load current can vary between 0 and 1 p.u. V_{tref} = 1 p. u.

4. For question 3, if the SVC is realized using an FC-TCR, design a voltage controller for phase margin (i) 45^0 and (ii) 60^0. Compare the two controllers in terms of the step responses. Step change must be given to reference voltage, reactive load current and the Thevenin voltage of the system.

5. For question 3, if the SVC is realized using a TSC-TCR, design a voltage controller for phase margin (i) 45^0 and (ii) 60^0. Compare the two controllers in terms of the step responses. Step change must be given to reference voltage, reactive load current and the Thevenin voltage of the system.