DFACTS DEVICES FOR VOLTAGE REGULATION IN DISTRIBUTION SYSTEM

OUTLINE

INTRODUCTION

PROBLEM STATEMENT

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INTRODUCTION



WHAT ARE DFACTS DEVICES?

• DFACTS, or Distributed Flexible AC Transmission System, refers to a category of power electronic devices used in electric power systems to enhance the controllability and flexibility of the transmission network.

WHY DFACTS DEVICES?

- DFACTS devices dynamically control parameters like voltage, current, and impedance in the power grid.
- These devices enhance power handling capacity, voltage regulation, system stability, and address issues like harmonics reduction.
- These devices are distributed across the power system rather than being centralized and hence provides localized and flexible solutions for optimizing power system performance.

ABOUT DSATACOM

DSTATCOM (Distribution Static Synchronous Compensator): It is used for reactive power compensation and voltage regulation. It injects or absorbs reactive power to maintain a stable voltage profile in the distribution system.

PROBLEM STATEMENTS



- MODEL A DISTRIBUTION SYSTEM AND SHOW THE VOLATGE PROFILE OF THAT SYSTEM
- PLOT DIFFERENT VOLTAGE PROFLILES
 FOR EACH POWER FACTOR OF THE LOAD
 AT ONE BUS
- MODELLING OF DIFFERENT DFACTS DEVICES
- PLOT THE VOLTAGE PROFILE OF DISTRIBUTION SYSTEM WITH DIFFEERENT DFACTS DEVICES AND COMPARING THE PERFORMANCE OF EACH DEVICE

MODELLING AND SIMULATION



1 RADIAL DISTRIBUTION SYSTEM

We modelled a radial distribution system with 10 buses with a supply of 400V, 50 Hz.

Resistance and Reactance values of the distribution line as 0.12 ohm/km and 0.86ohm/km.

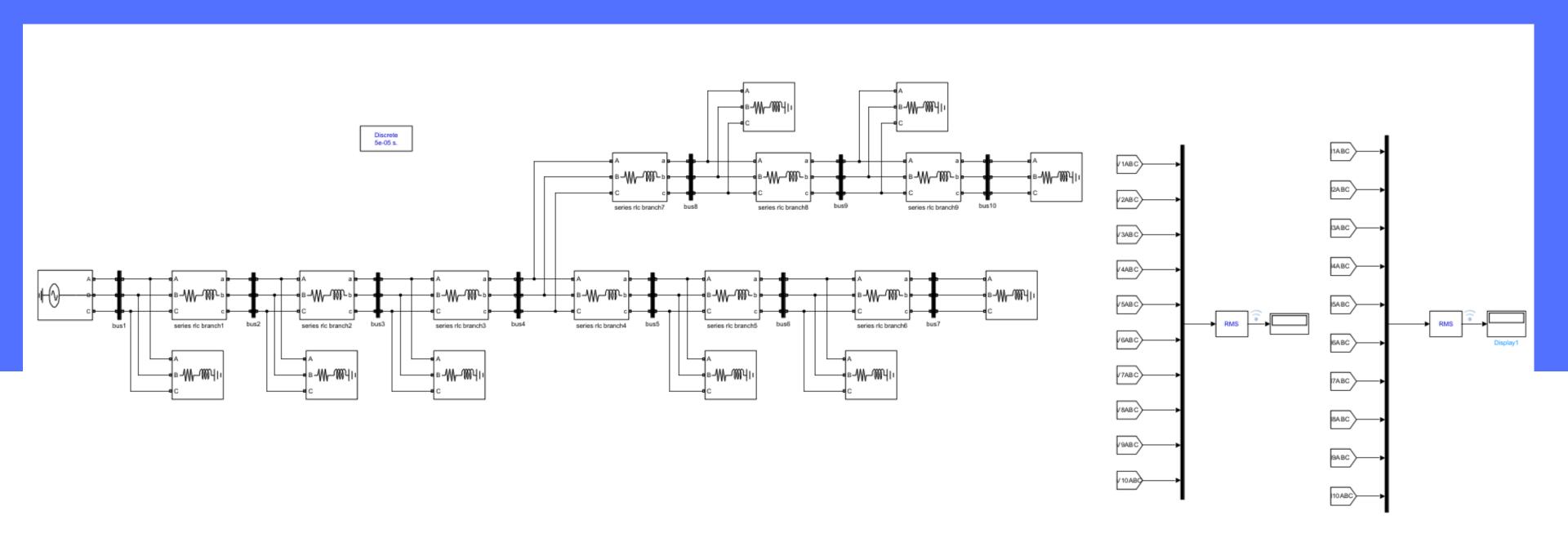
2 VOLTAGE PROFILE

- Plot of voltage across each bus
- Plot of voltage variation when power factor is varied from +90 to -90 at bus 5.

3 ADDITION OF D-FACTS TO THE SYSTEM

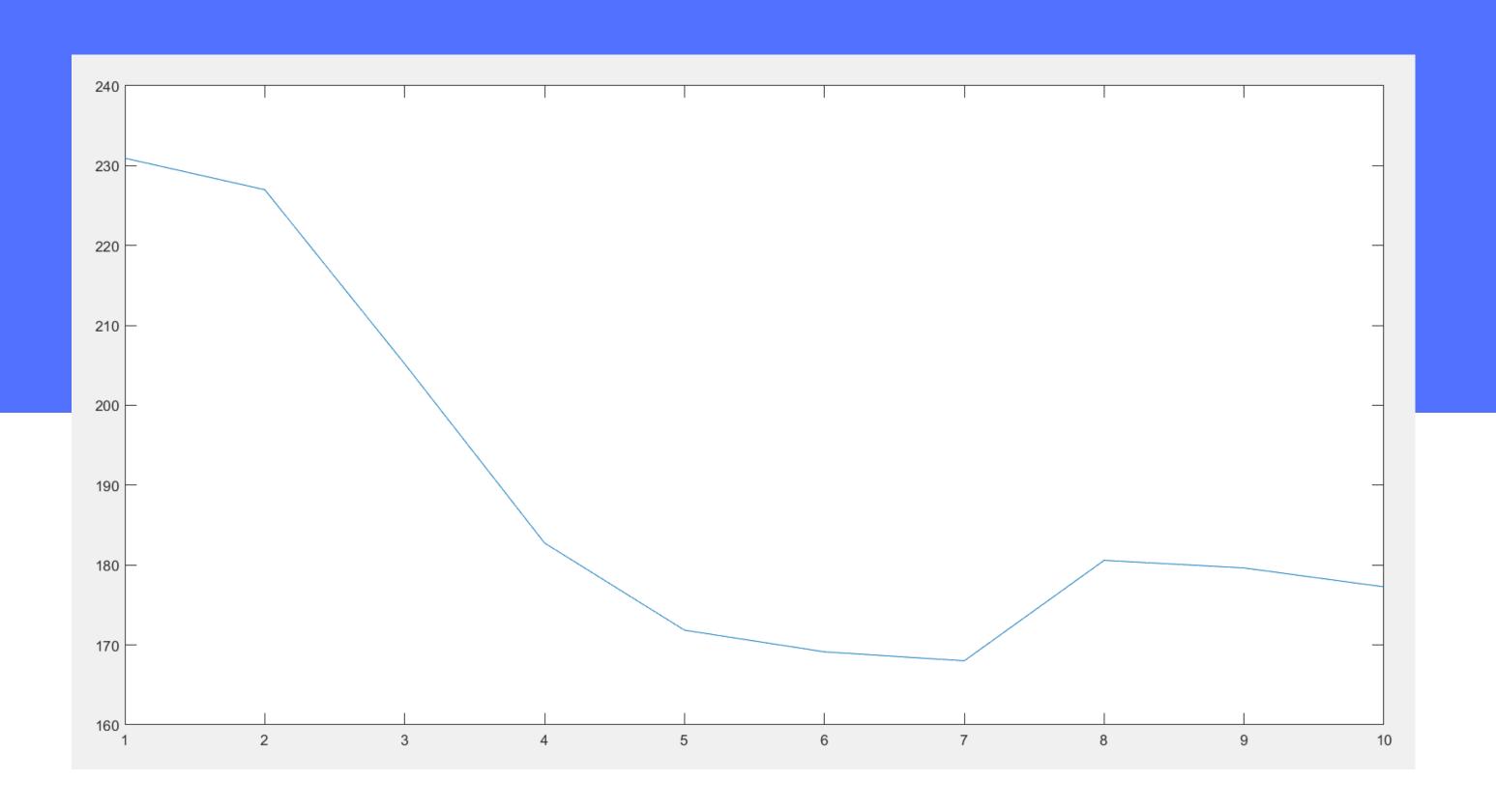
DSTATCOM

MATLAB MODEL OF THE DISTRIBUTION SYSTEM



a simple radial distribution system with voltage and current measurements at each bus

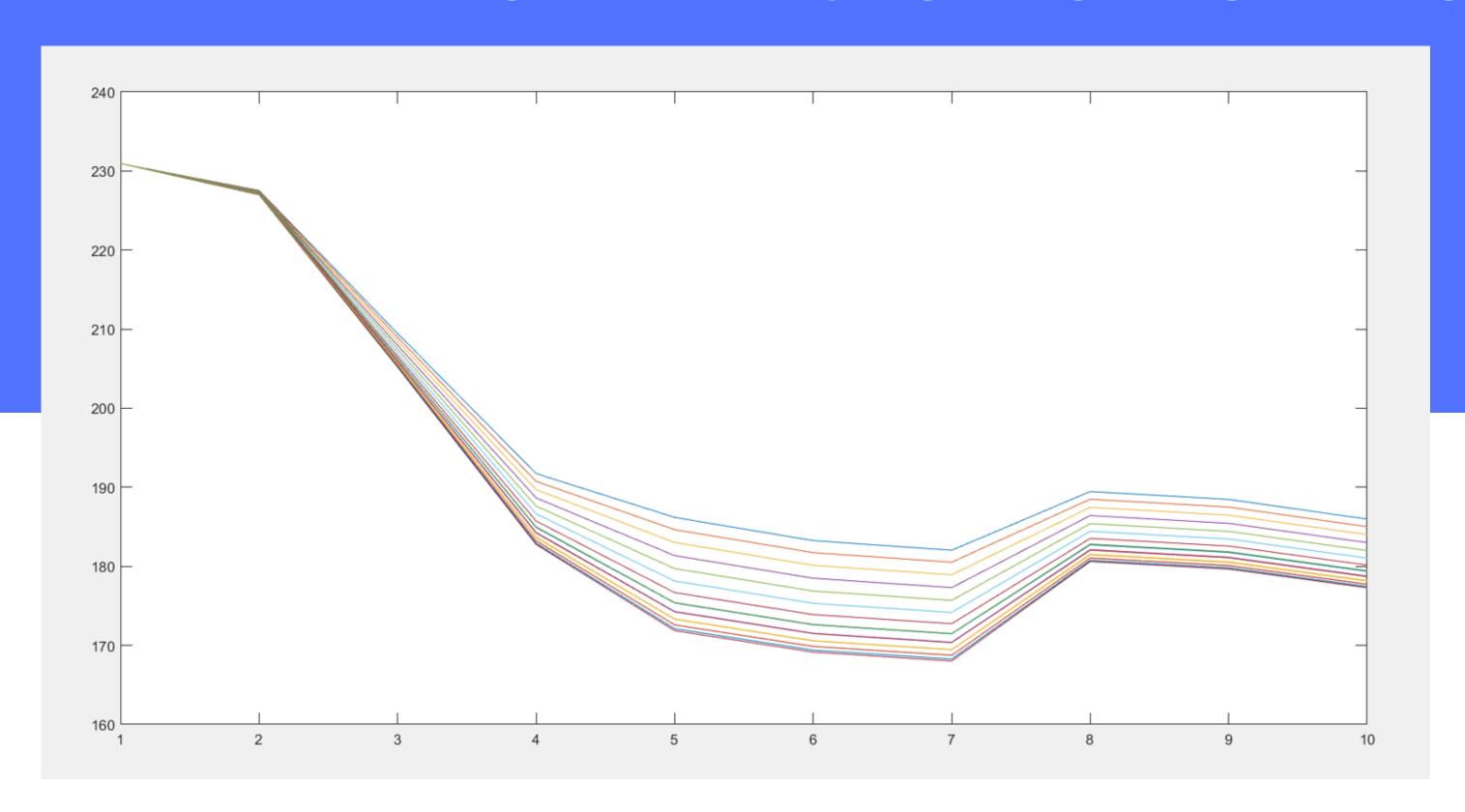
VOLTAGE PROFILE OF THE DISTRIBUTION SYSTEM



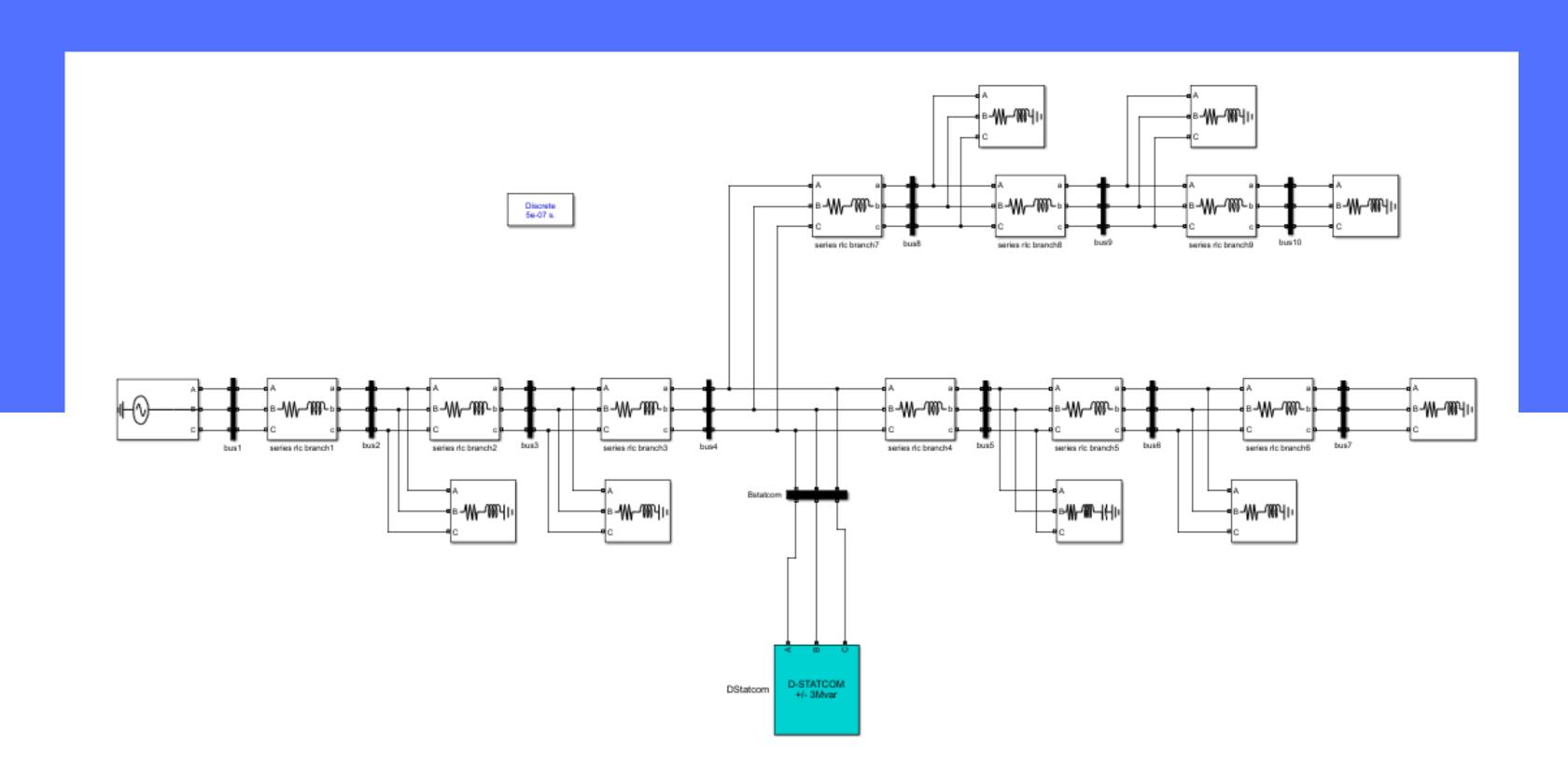
MATLAB CODE FOR PLOTTING VOLTAGE PROFILE OF DISTRIBUTION SYSTEM FOR DIFFERENT POWER FACTOR LOADS AT ONE BUS

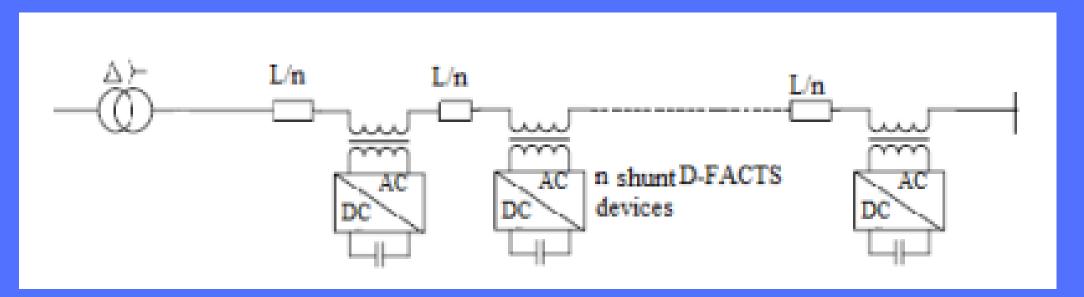
```
project code.m × +
          phi = [-90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90];
          s= 2915.4759;
        for i = 1:((length(phi)-1)/2)
              simIn(i) = Simulink.SimulationInput('old');
              simIn(i) = setVariable(simIn(i), 'q2', (-1*s*sind(phi(i))));
              simIn(i) = setVariable(simIn(i), 'p2', s*cosd(phi(i)));
              simIn(i) = setVariable(simIn(i), 'q3',0);
          end
          for i =((length(phi)-1)/2)+1:(length(phi))
               simIn(i) = Simulink.SimulationInput('old');
10
          simIn(i) = setVariable(simIn(i), 'q3', s*sind(phi(i)));
11
              simIn(i) = setVariable(simIn(i), 'p2', s*cosd(phi(i)));
12
              simIn(i) = setVariable(simIn(i), 'q2',0);
13
14
          end
          simOutputs = sim(simIn);
15
16
         for x= 1:10
             for y=1:19
17
                  y_5(x,y) = simOutputs(1,y).voltages(1,x)
18
19
20
              end
21
          end
22
          plot(v5)
```

VOLTAGE PROFILE OF THE DISTRIBUTION SYSTEM FOR DIFFERENT POWER FACTOR LOADS AT BUS 5

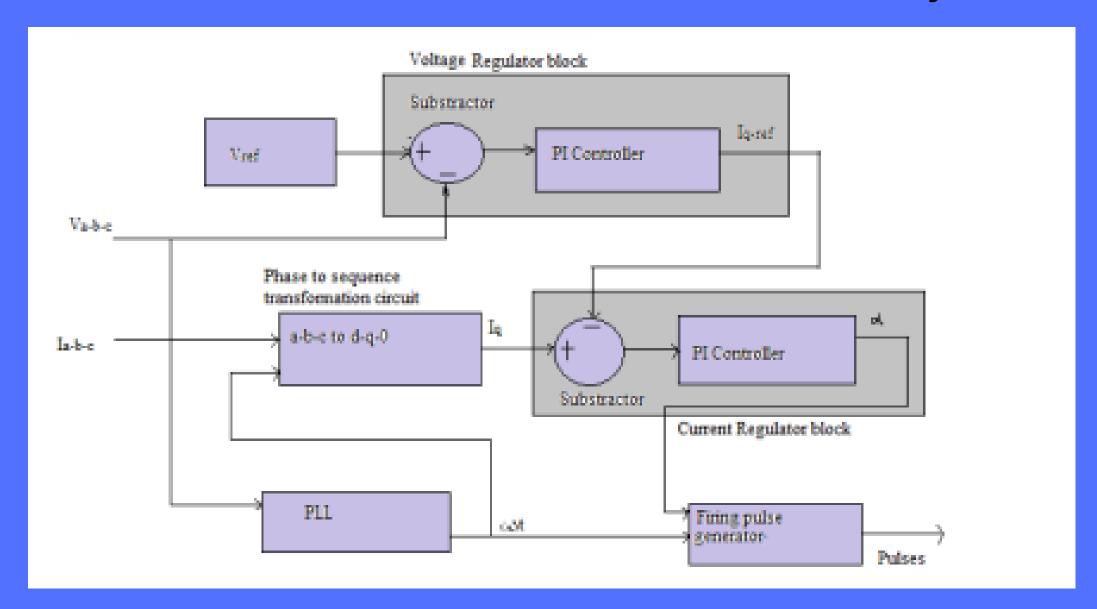


MATLAB MODEL OF THE DISTRIBUTION SYSTEM WITH DSTATCOM



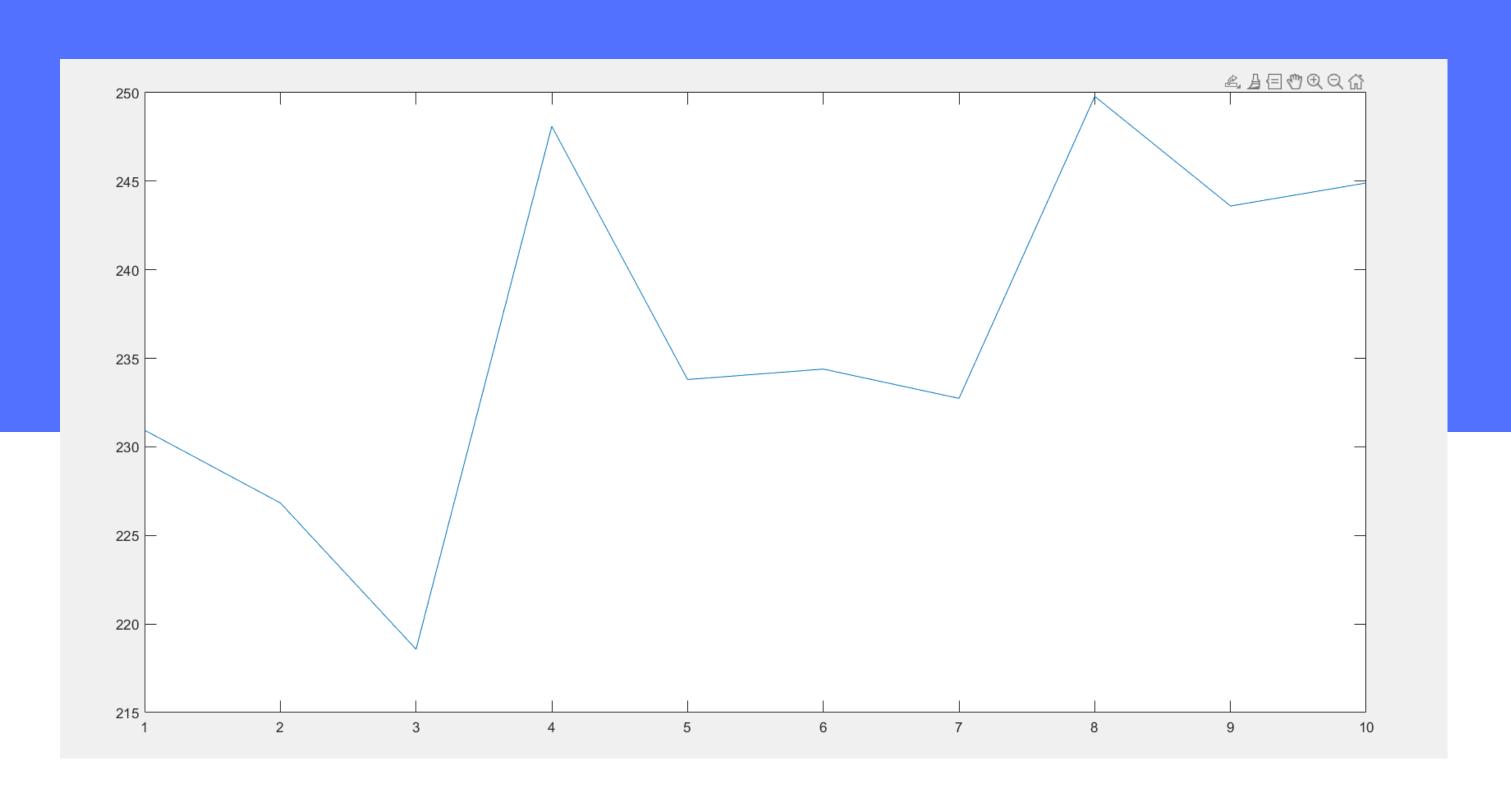


D-STATCOM Constituents and its Connection to System



Block Diagram Representation of Control Scheme of D-STATCOM

VOLTAGE PROFILE OF THE DISTRIBUTION SYSTEM WITH DSTATCOM



REFRENCES

- Test Distribution Systems: Network Parameters and Diagrams of Electrical Structural MEISAM MAHDAVI 1, HASSAN HAES ALHELOU 2 (Senior Member, IEEE), AND PAUL CUFFE 2 (Member, IEEE)
- 2 CORE ALUMINIUM PVC ARMOURED POWER CABLES, POWER CAB
- Distributed Flexible AC Transmission System (D-FACTs), Bhavna Rathore
- DSSC: Distributed power flow controller S.R.Goigowal, M.M. renge
- DSSC:A Distributed Static Series
 Compensator System for Realizing Active
 Power Flow Control on Existing Power Lines,
 DEEPAK DIVAN