Assignment 1

Dynamic Load and Fault Analysis of INPS using DPL

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Objectives

Model	Section of the INPS system with at least five buses and two generators.
Analyze	Bus voltage variations under hourly load changes.
Examine	Effects of a self-clearing fault near the largest generator or critical line.
Present	Results for bus voltage, frequency, rotor angle, and other variables of interest.

Model and Simulation Setup

INPS Section	Eastern Region
No. of Buses	13
No. of Generators	6
Load Variation	Hourly Load Curve
Fault Type	3- Φ fault at bus connected to largest Generator (Godak)
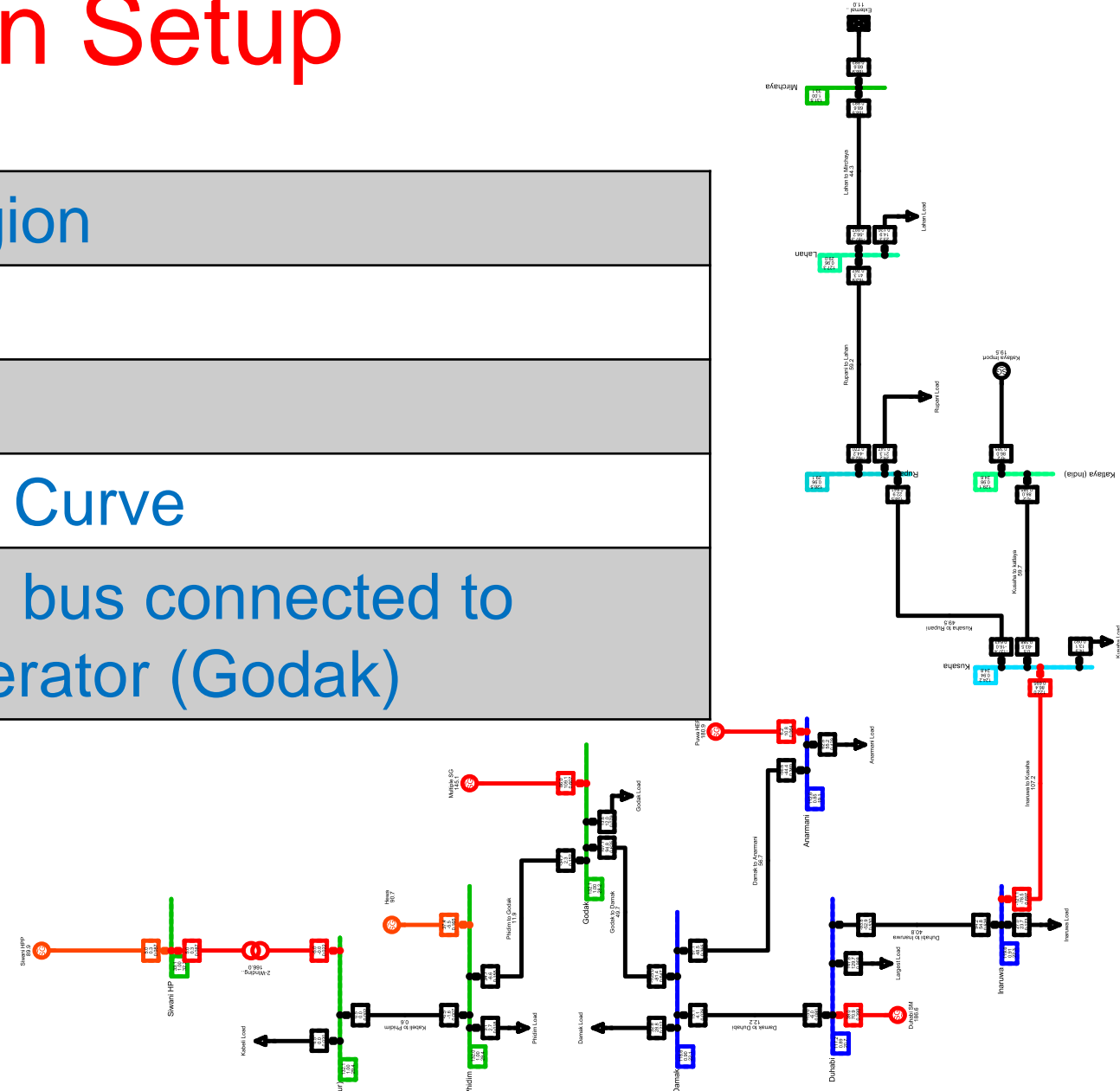
1. Load Flow Analysis using DPL

Program Logic

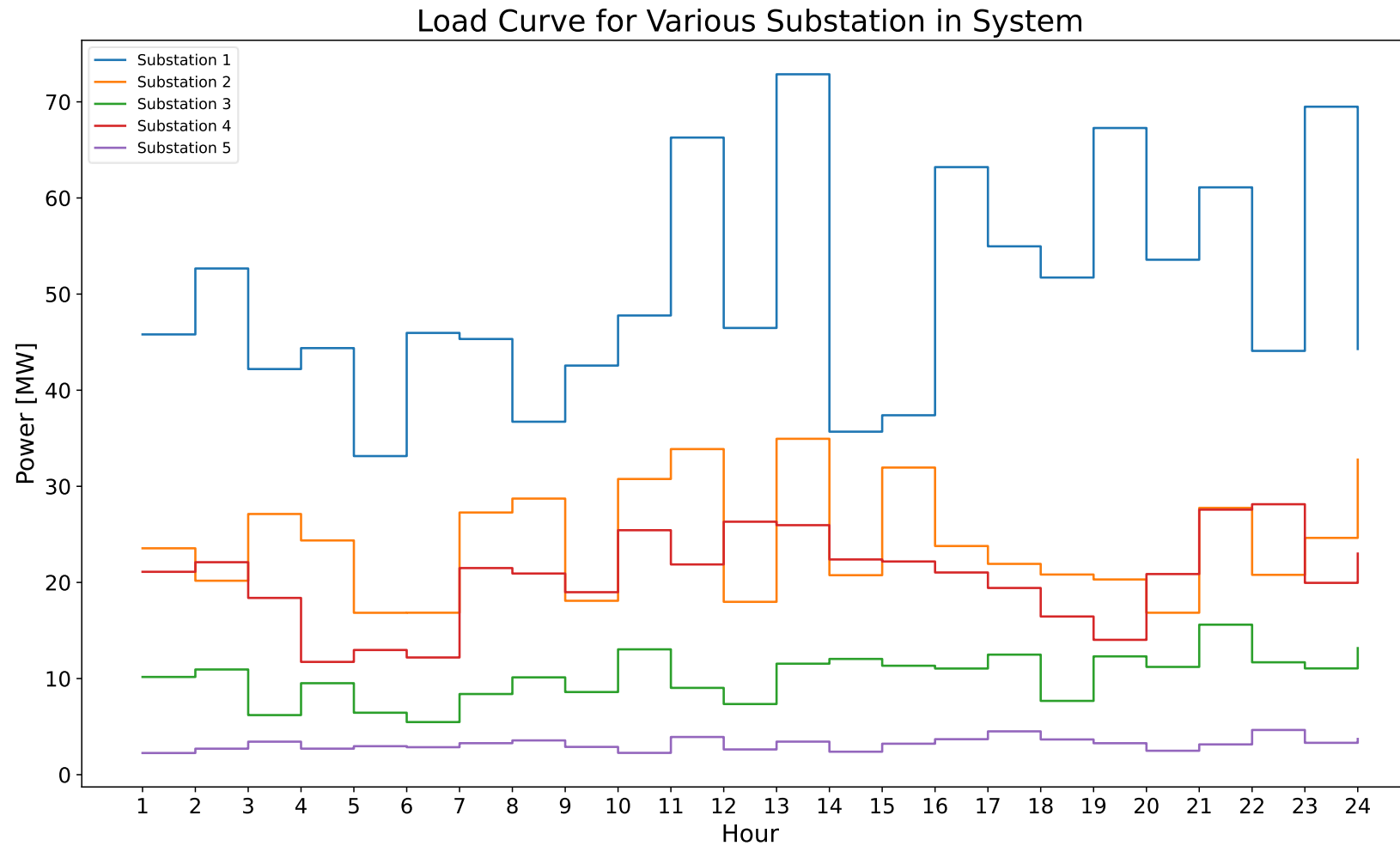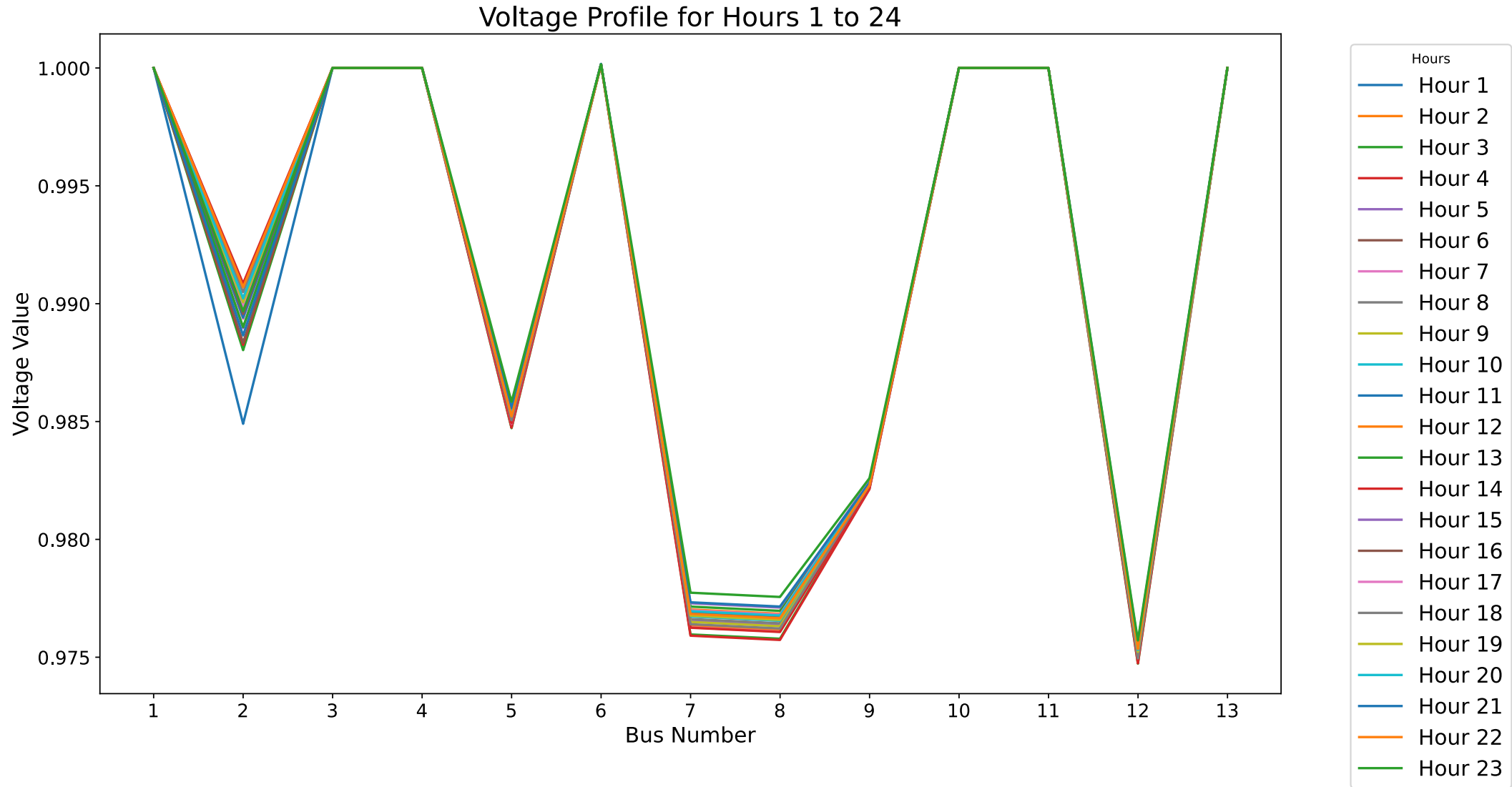| Import 24 hr Load Data from .xlsx file to Matrix	→	Run Load Flow Analysis	→	Export Result to .csv File

Input: Load Curve

Load Curve for Various Substation in System

Output : Bus Voltage Profile

Voltage Profile for Hours 1 to 24
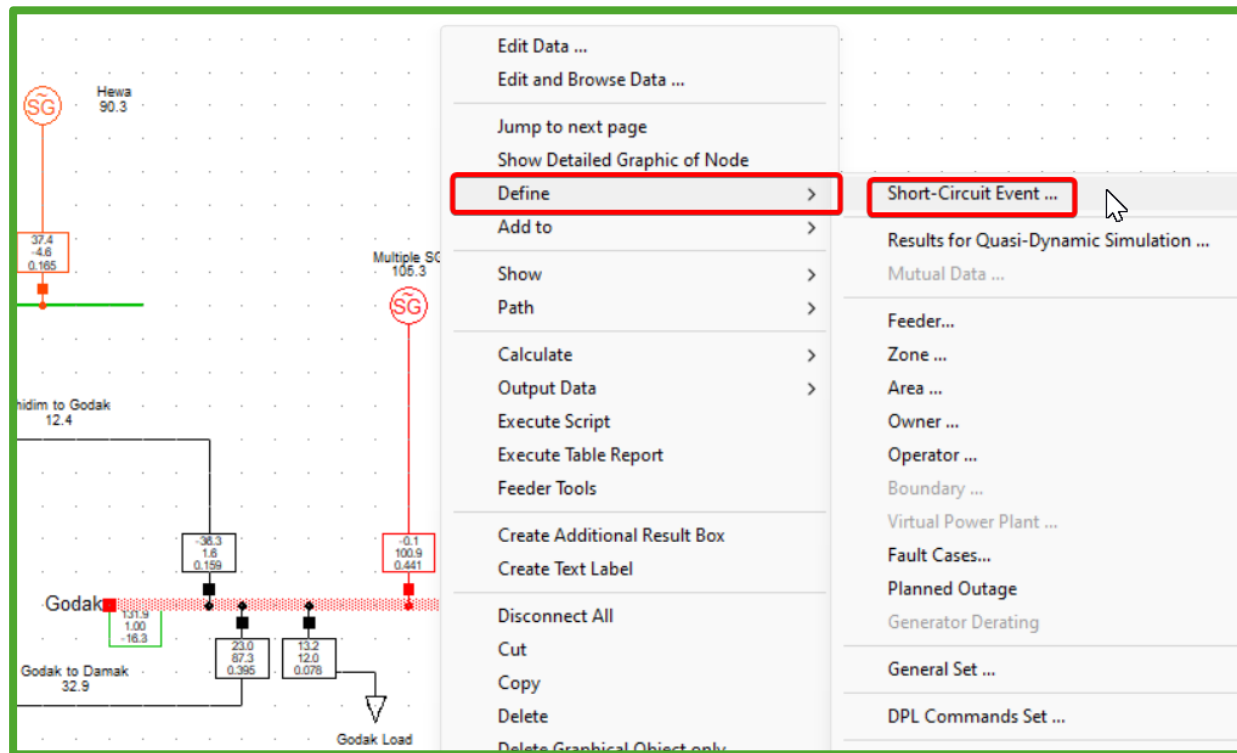
2. RMS Simulation

Fault in	Godak Bus
Fault Applied at	10 sec
Fault Cleared at	10.2 sec
Fault Type	3- Φ fault at bus connected to largest Generator (Godak)
Variables Monitored	Bus Frequency, Rotor Angle, Rotor Speed

Applying Fault

- self-clearing fault near the largest generator

RMS Simulation using DPL

```
Take Input
Number of Bus
Number of Loads
```
→
```
Define
Sets and Objects
for Calculation
```
→
```
Run
Initial condition
```
↓
```
Export
Result to .csv File
```
←
```
Load
Resut File to
Matrix
```
←
```
Run
RMS Simulation
```
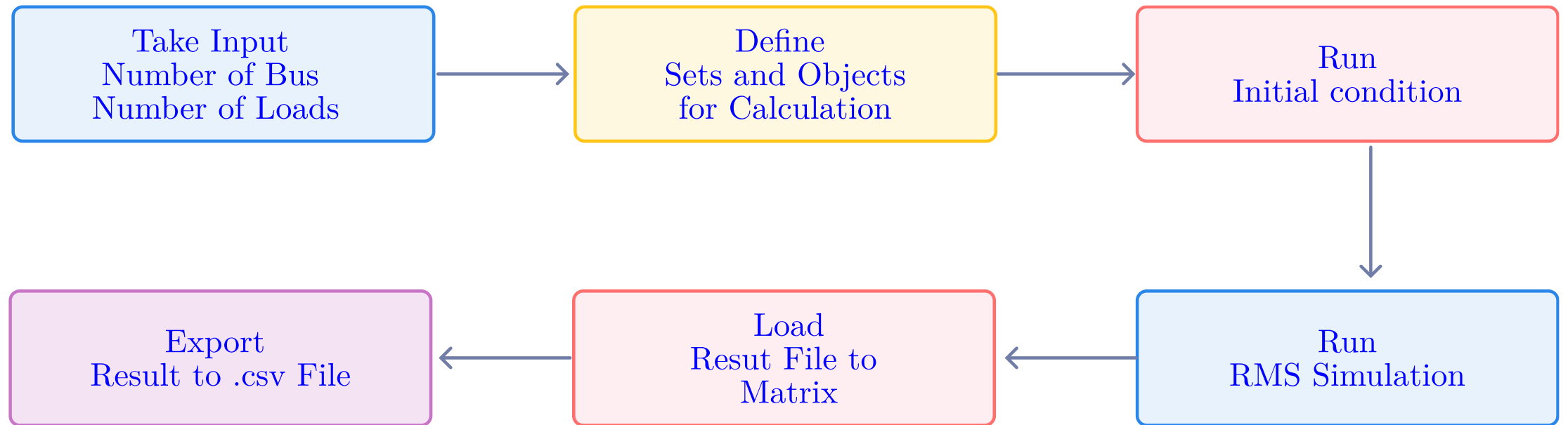
Output: Bus Frequency

Bus Frequency vs Time Plot

Output: Generator Speed

Generator Speed vs Time Plot
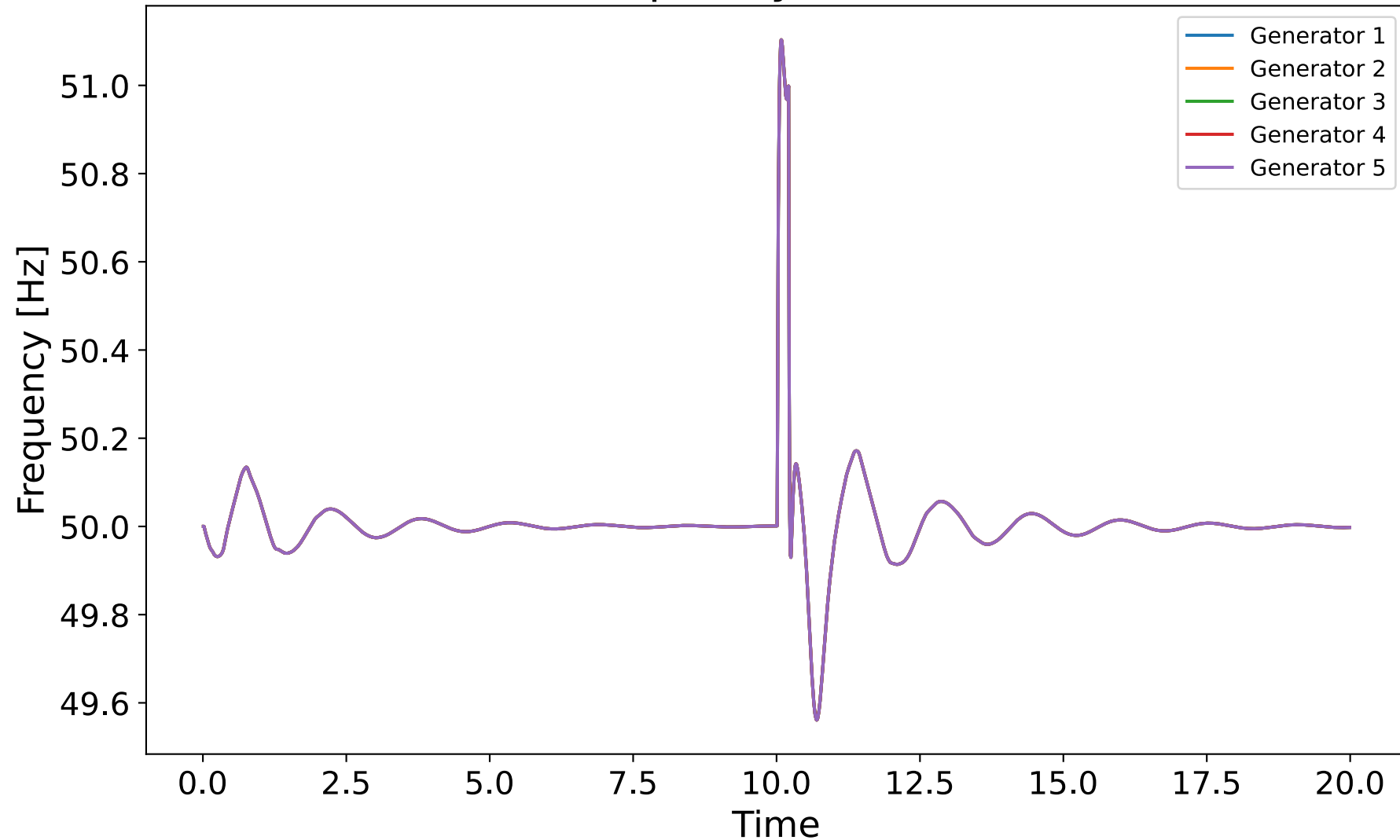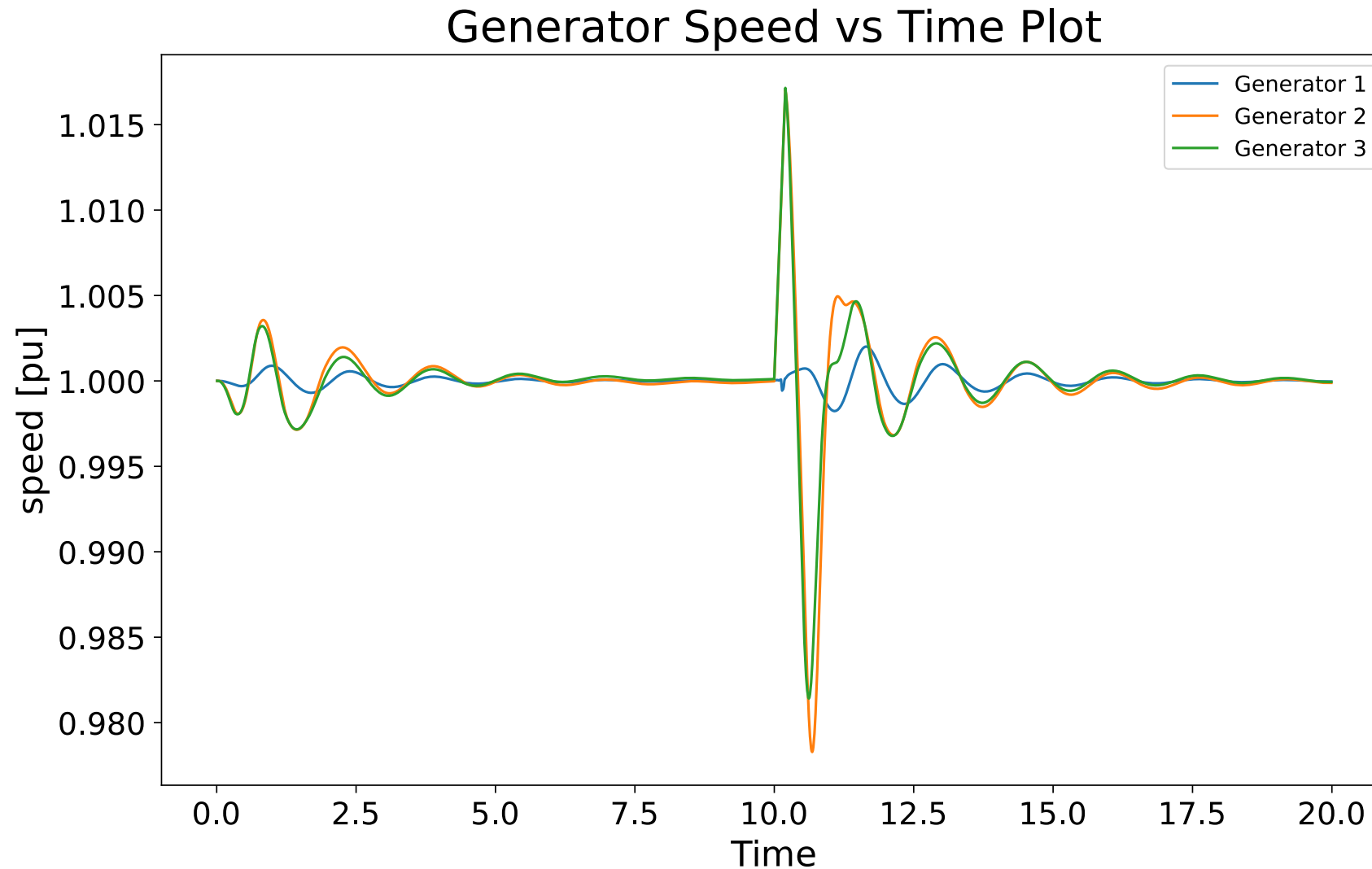
Output: Rotor Angle

Rotor Angle vs Time Plot
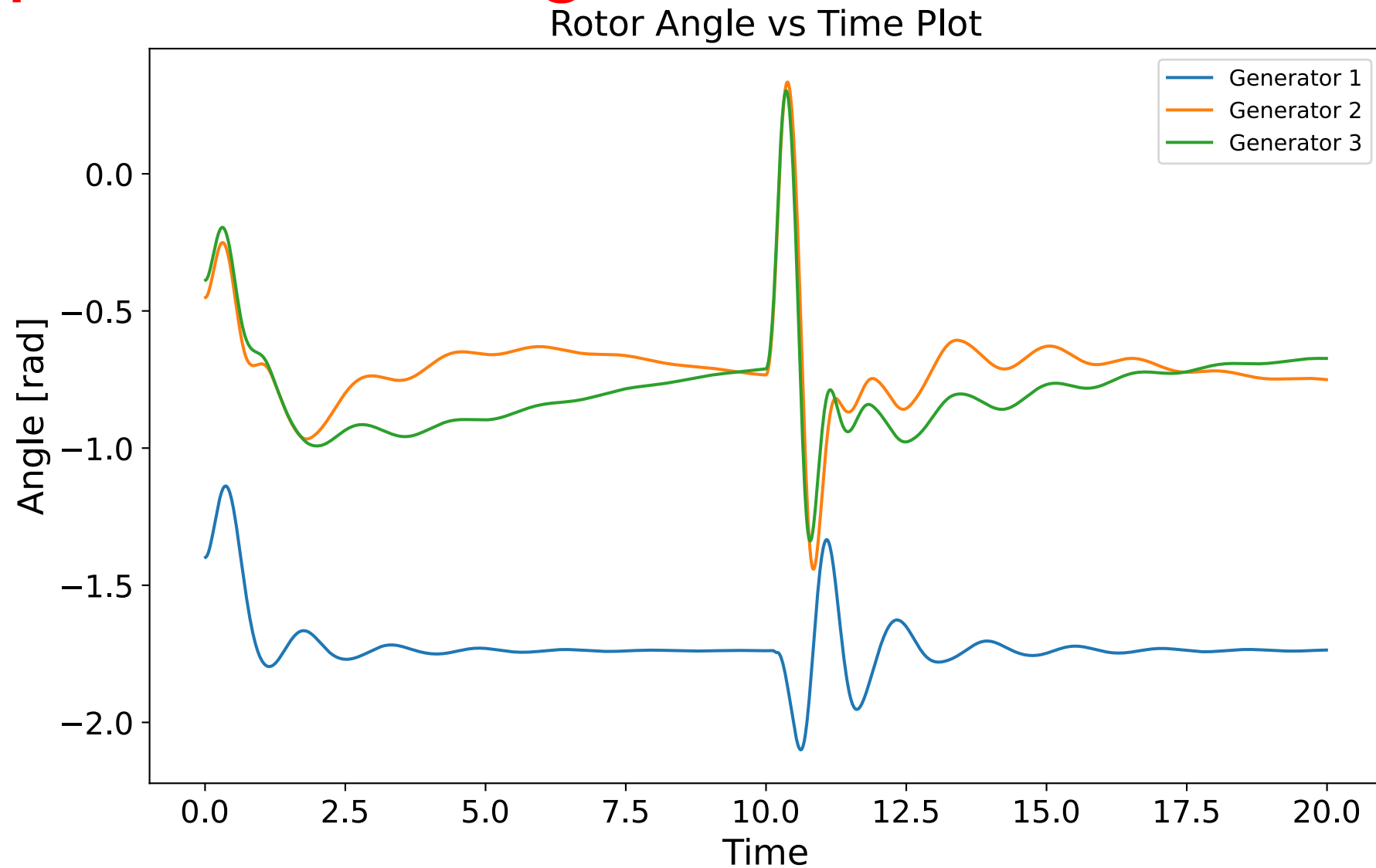
Conclusions

- Dynamic Programming Language (DPL) is particularly useful for analyzing larger systems due to its flexibility and capability to handle complex power system simulations effectively.

All Simulation Files