MPPT Design with PO Algorithm–Abeeb Akorede Bello

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- Algorithm
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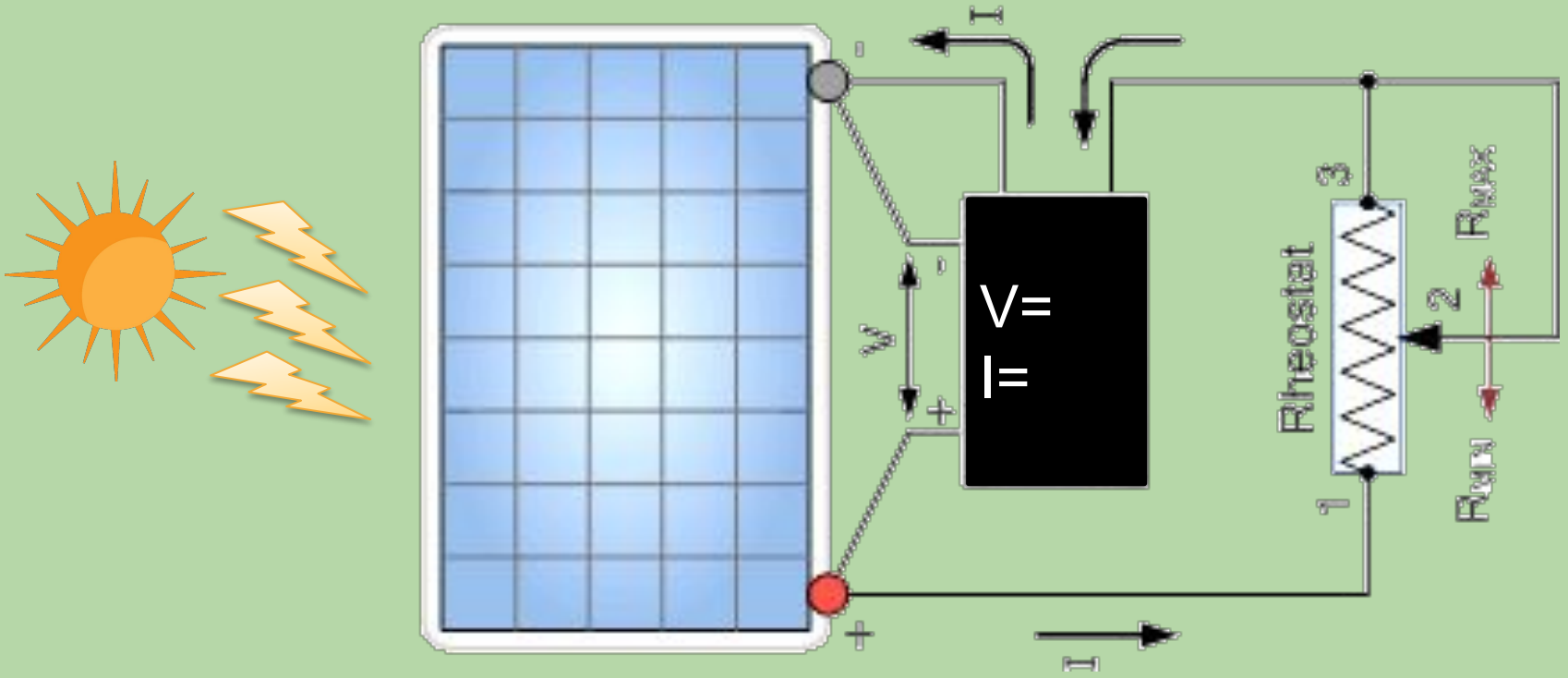
Solar PV Panel

Maximum Power

Load Test



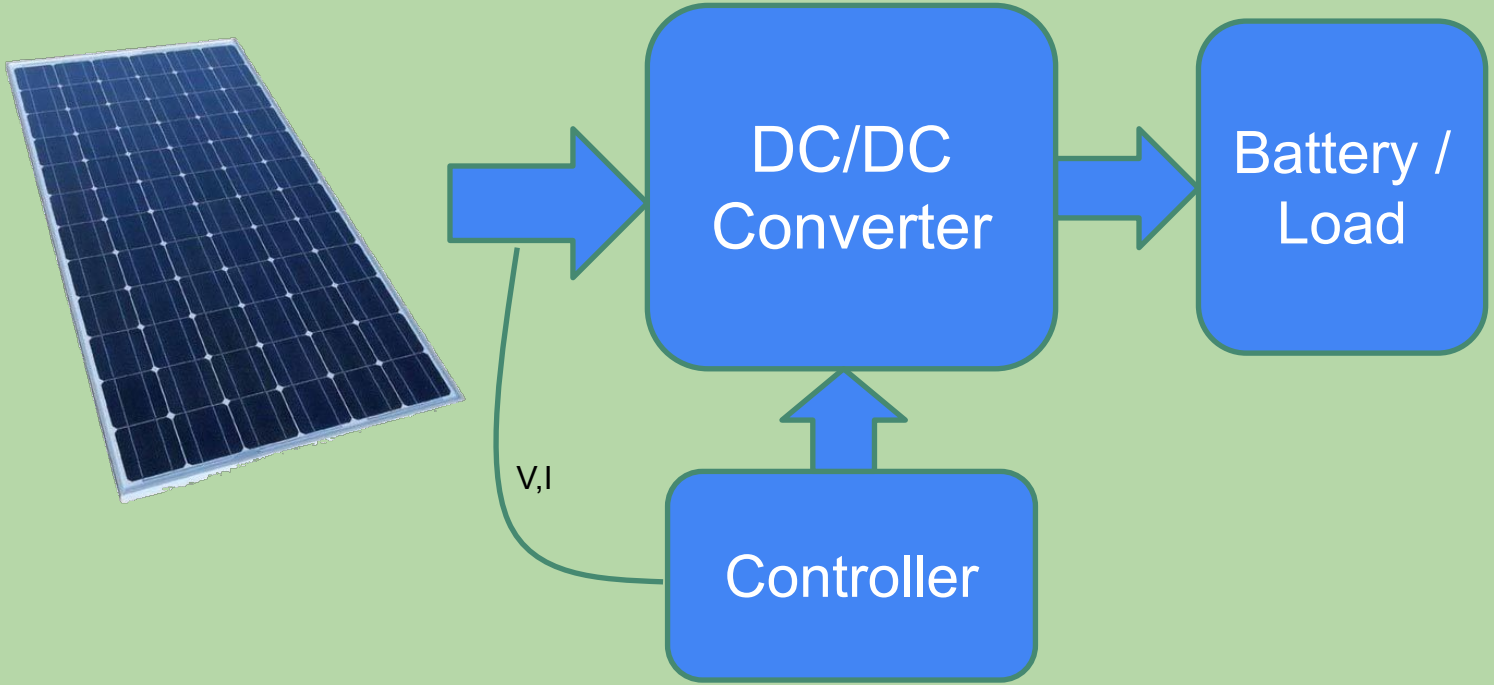
Maximum Power Point

MPPT

Maximum Power Point Tracking is algorithm that included in charge controllers used for extracting maximum available power from PV module under certain conditions

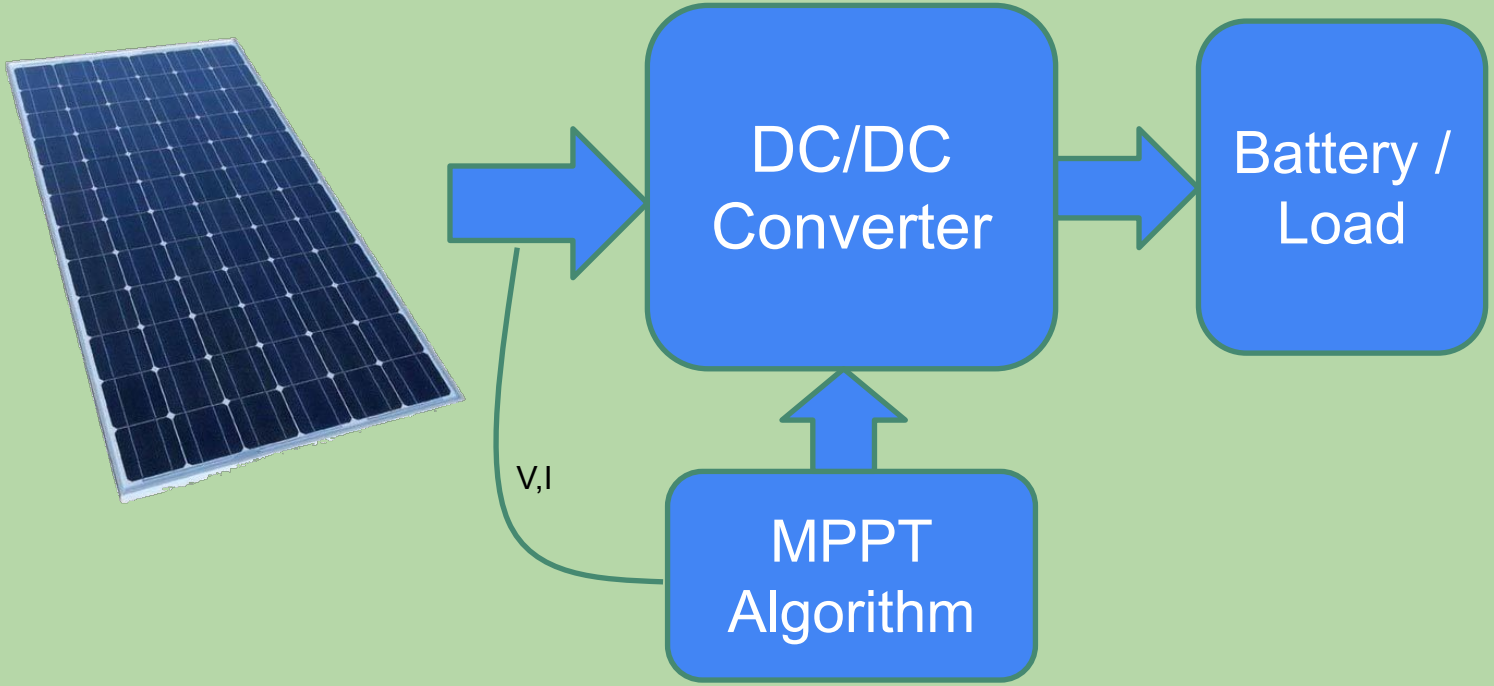
Maximum power varies with **solar radiation**, **ambient temperature** and **solar cell temperature**.

Working Principle – power converter



MPPT is to extract the maximum available power from PV module by making them operate at the most efficient voltage

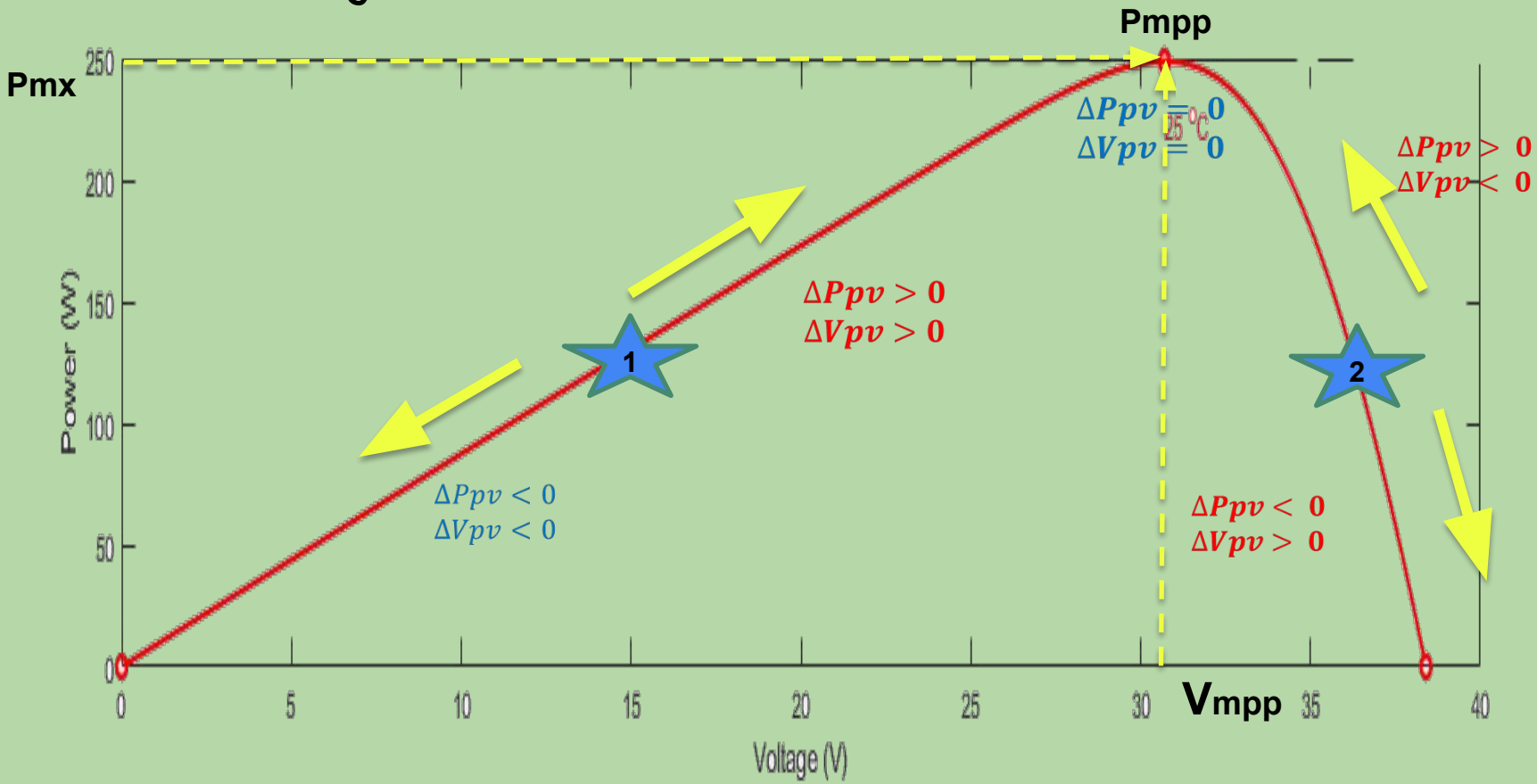
MPPT Controller



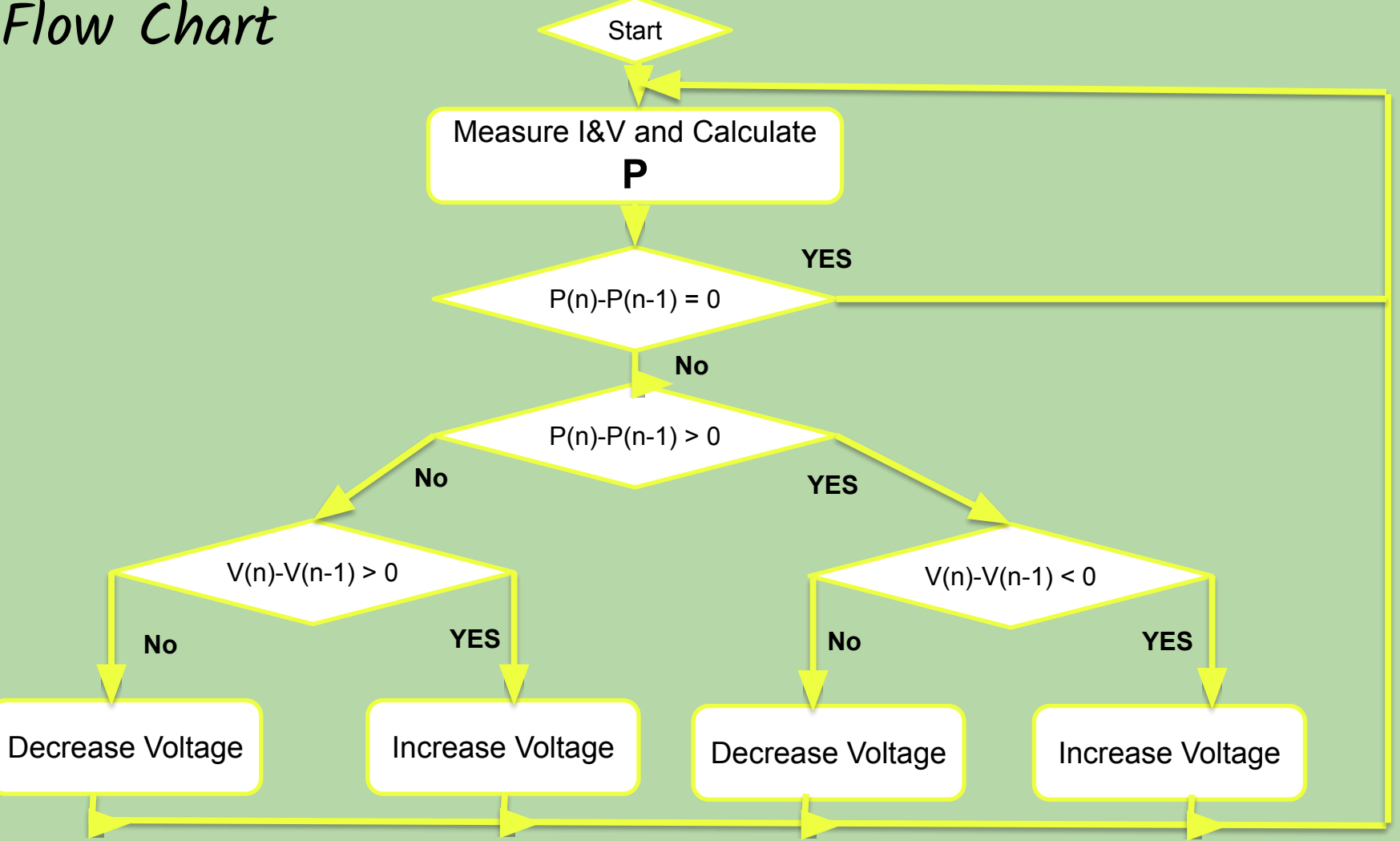
Algorithm

1. PO
2. IC
3. Fuzzy

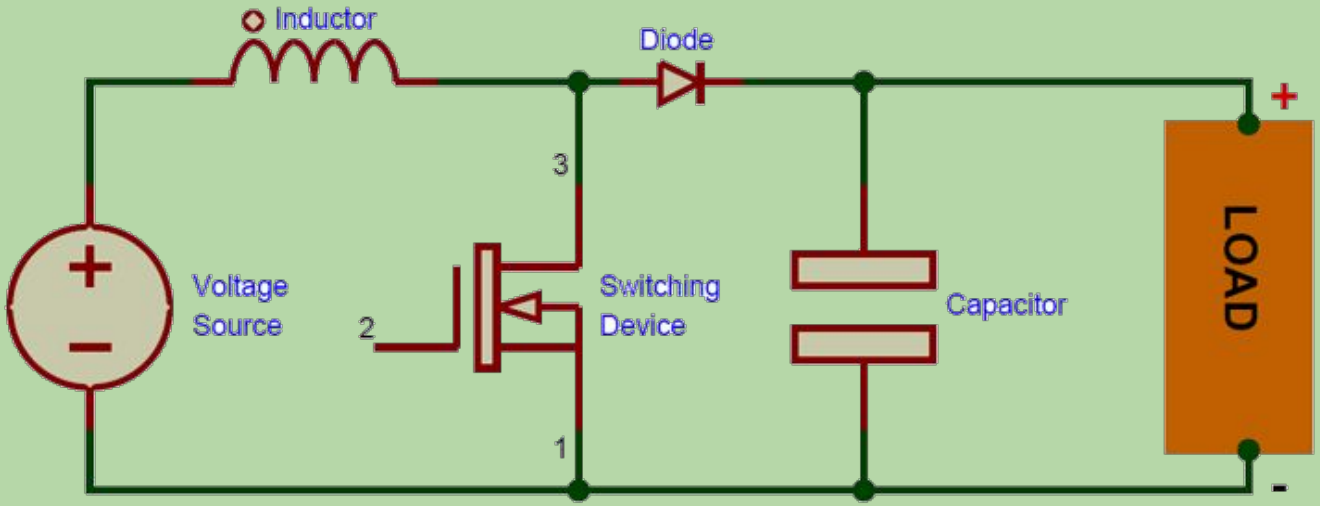
P & O Algorithm



Flow Chart


Start
Measure I&V and Calculate
P
P(n)-P(n-1) = 0
YES
No
P(n)-P(n-1) > 0
No
YES
V(n)-V(n-1) > 0
V(n)-V(n-1) < 0
No
YES
No
YES
Decrease Voltage
Increase Voltage
Decrease Voltage
Increase Voltage

Boost Converter



Power :
250W

Design Calculation

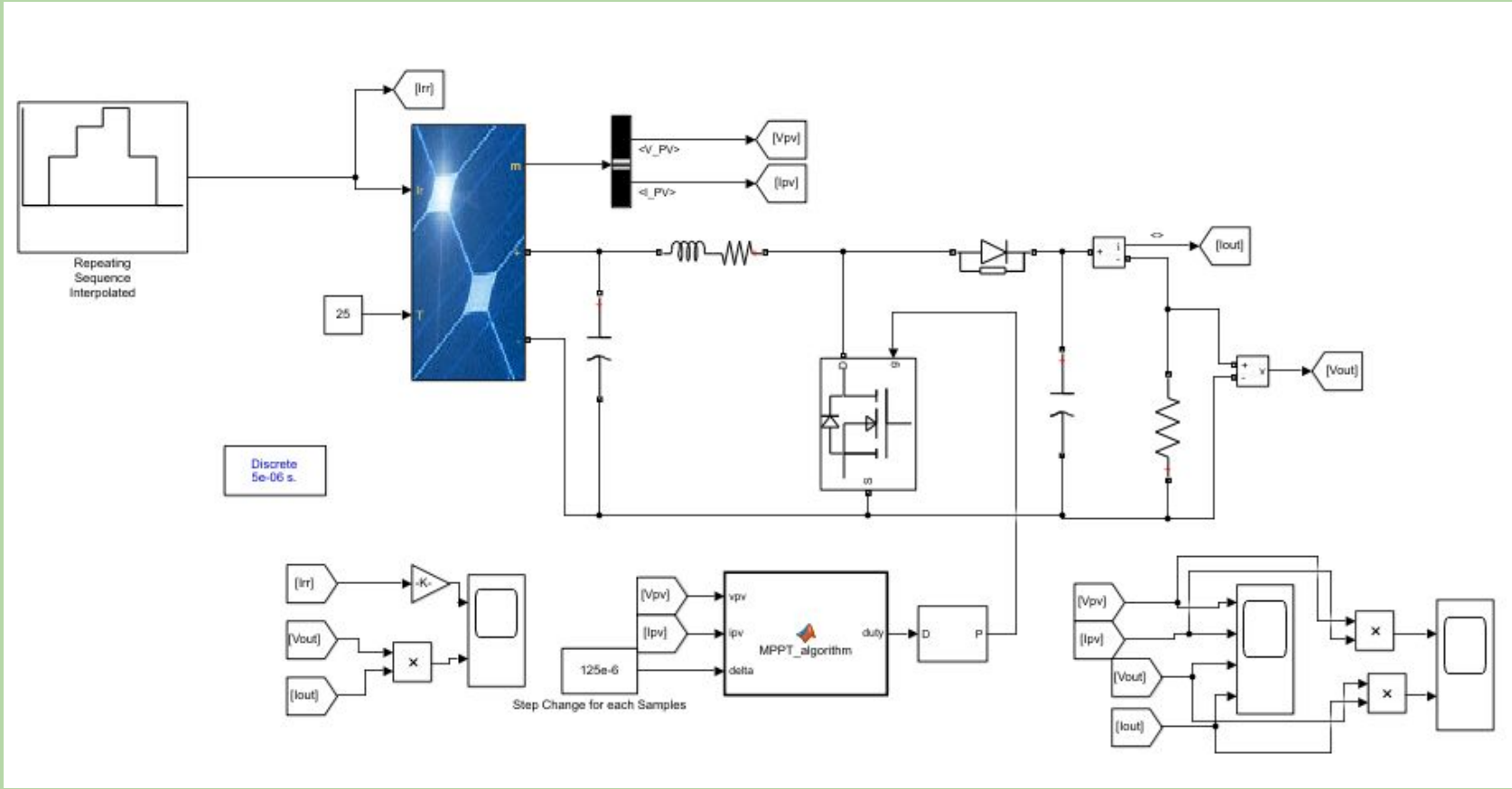
Inductance (L) =

$$\frac{Vin_min * D}{Fs * \Delta ILmax}$$

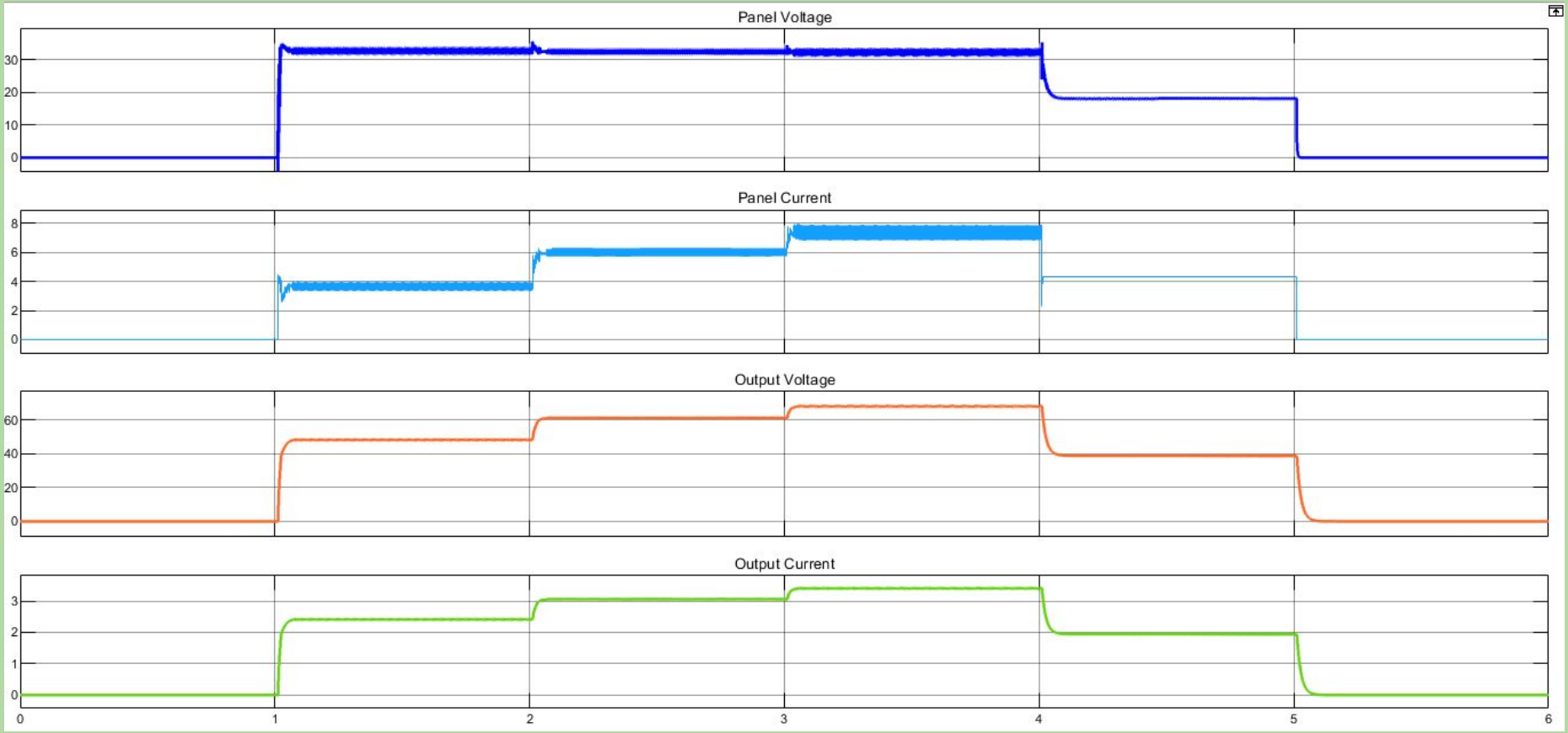
Capacitance (C) =

$$\frac{Iomax * D}{Fs * \Delta Vc}$$

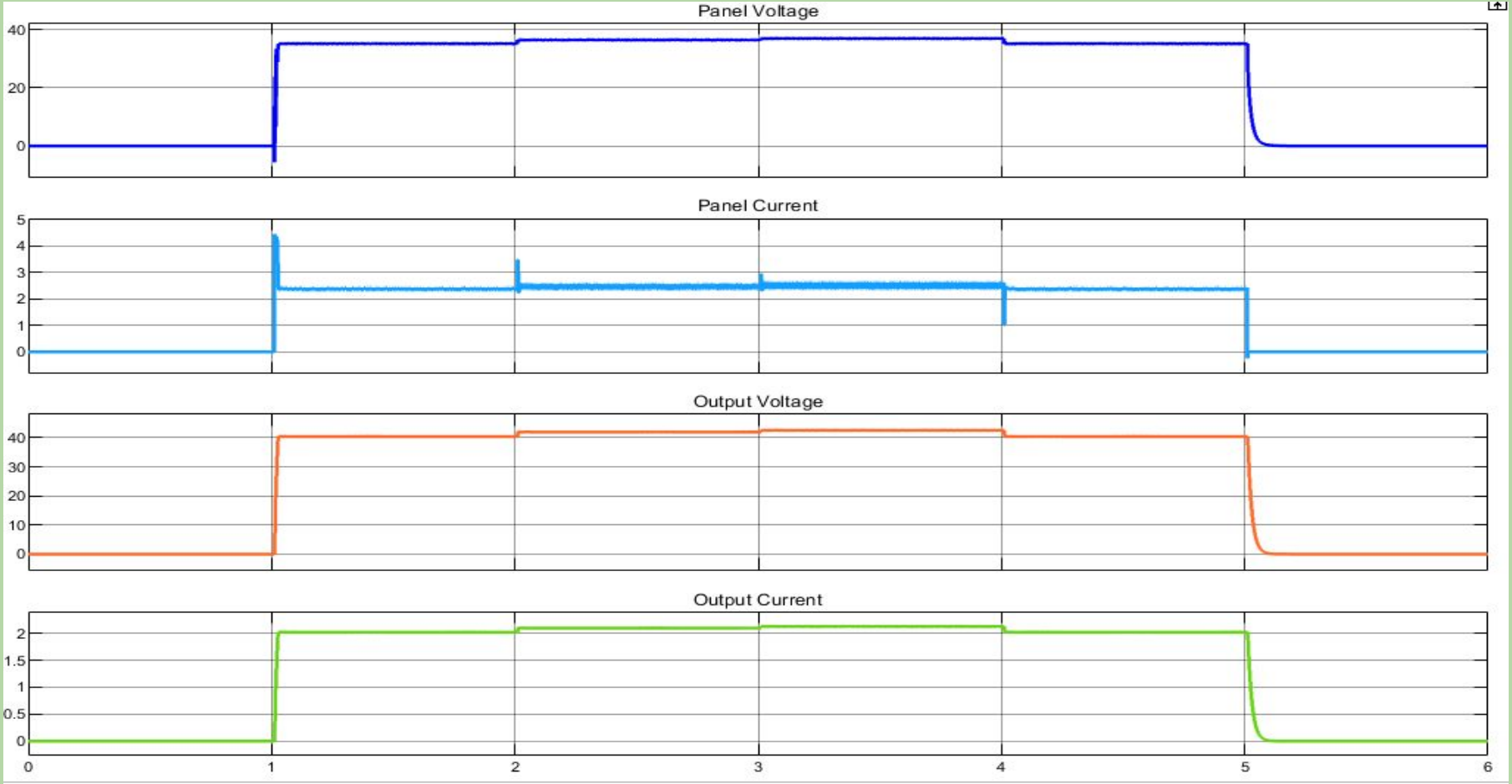
Matlab Simulation



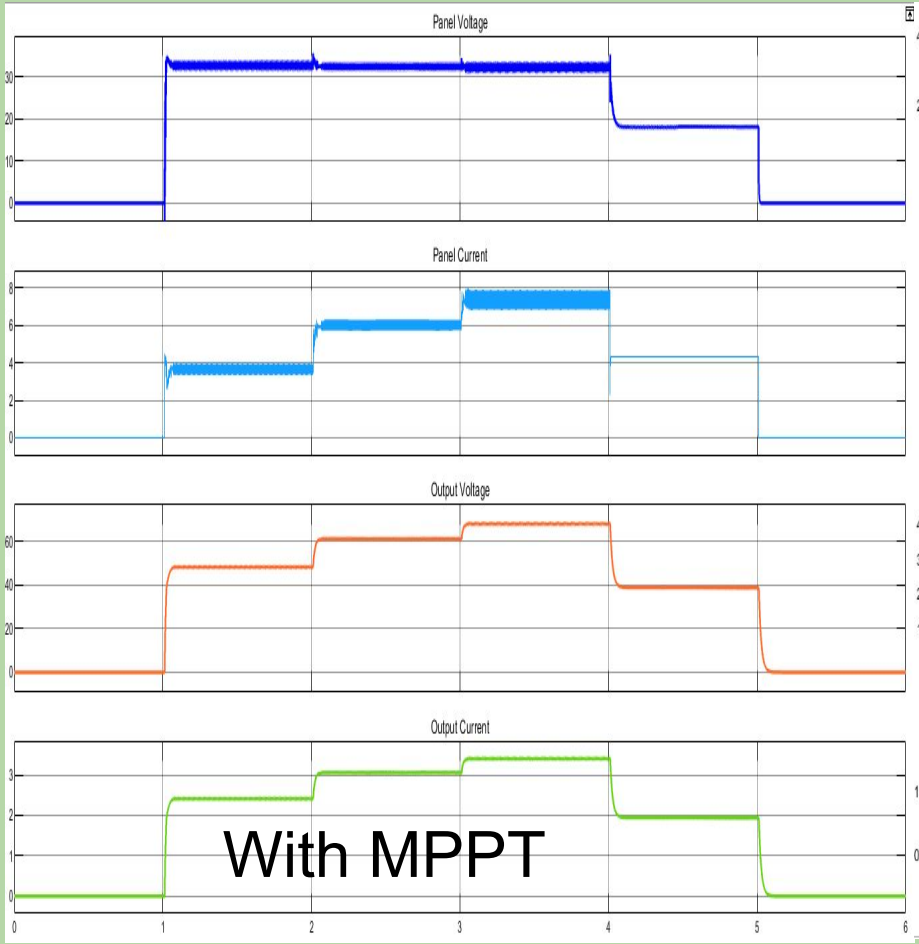
Result

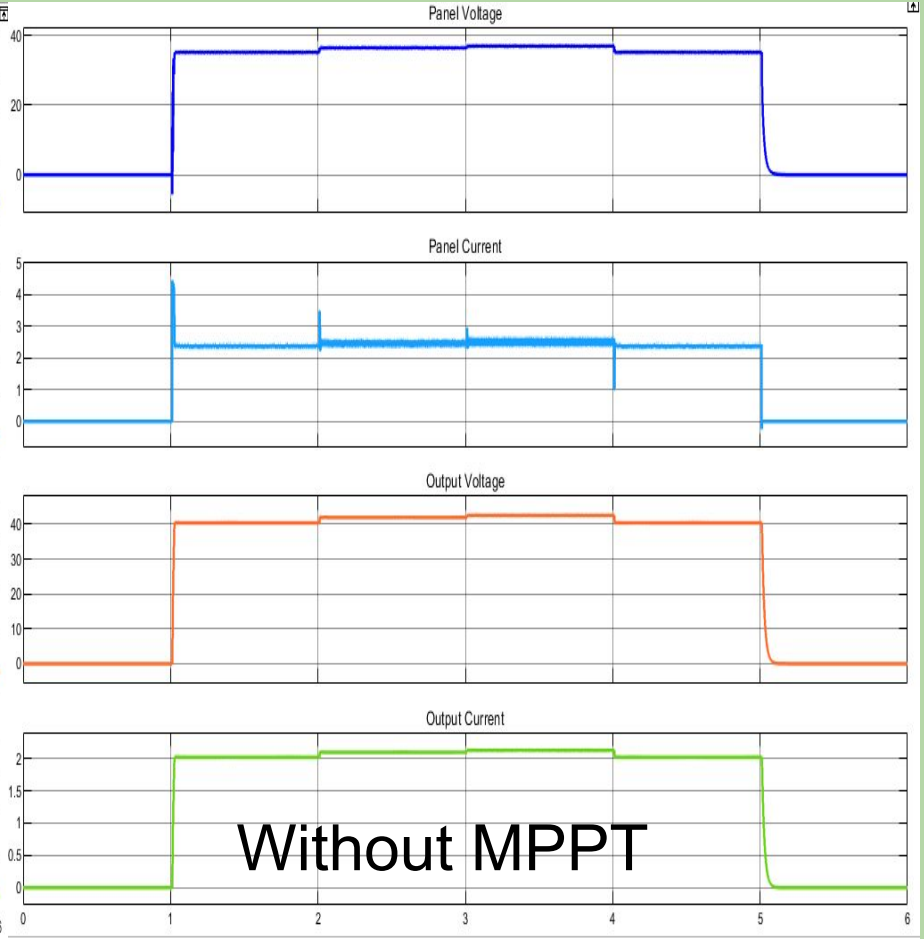

Panel Voltage
30
20
10
0
Panel Current
8
6
4
2
0
Output Voltage
60
40
20
0
Output Current
3
2
1
0
0
1
2
3
4
5
6

Result

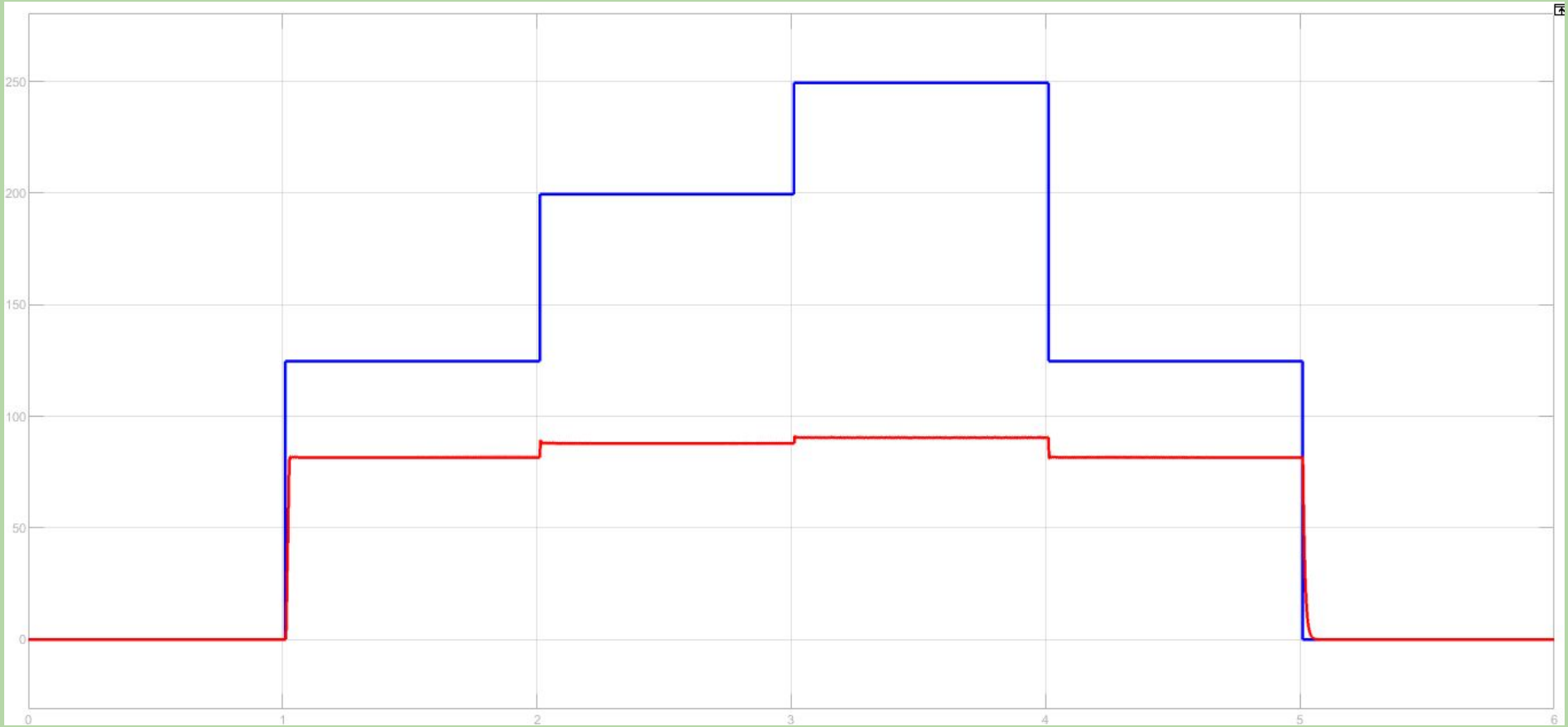
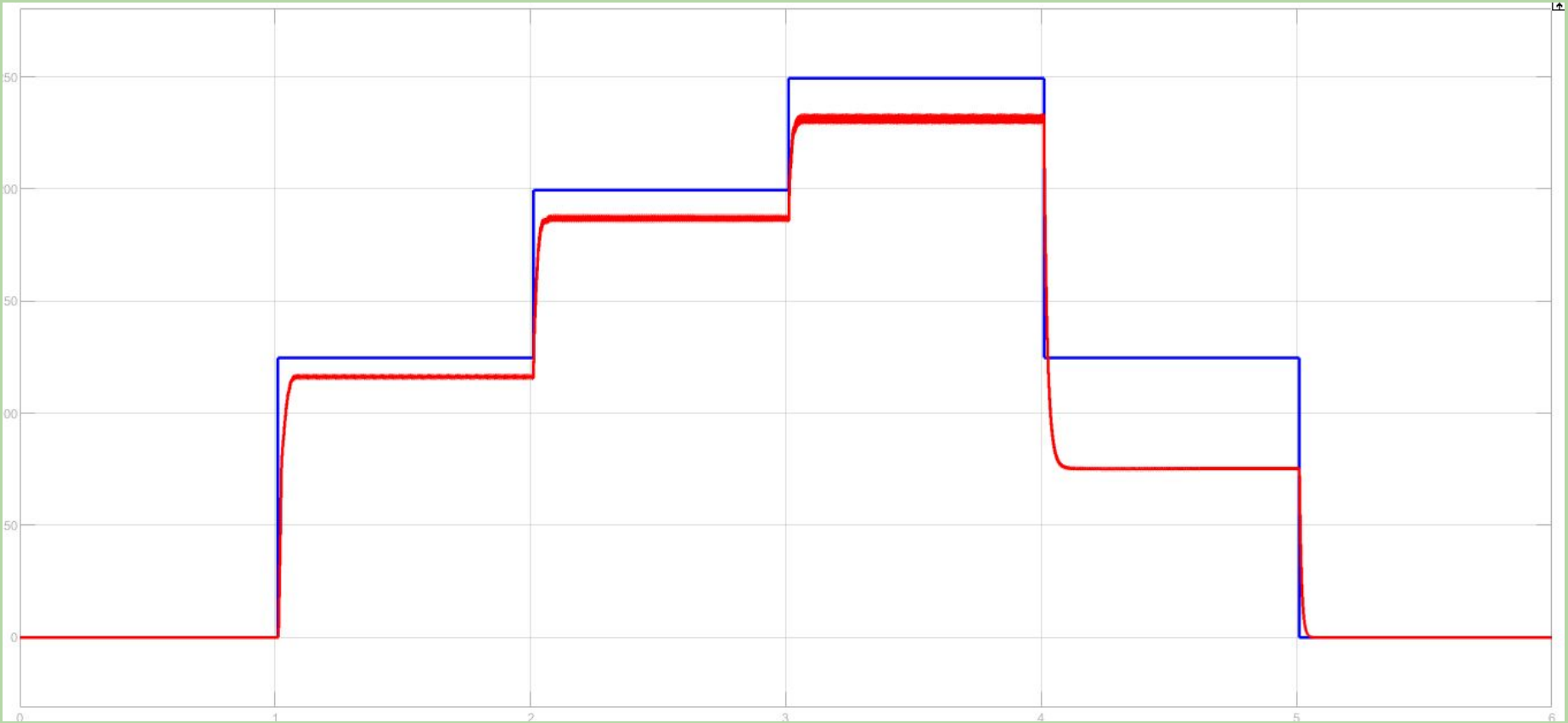

Panel Voltage
40
20
0
Panel Current
5
4
3
2
1
0
Output Voltage
40
30
20
10
0
Output Current
2
1.5
1
0.5
0
0
1
2
3
4
5
6

Result


Panel Voltage
Panel Current
Output Voltage
Output Current
With MPPT


Panel Voltage
Panel Current
Output Voltage
Output Current
Without MPPT

Power output without mppt



Output Power - with MPPT