My research plan for the master's program

Suresh Kumar Gadi

FIME-UT, UAdeC

20$^{\text{th}}$ December 2016

Overview

Examples of independent research topics

- Maximum Power Point Tracking (MPPT)
- Hybrid power supplies
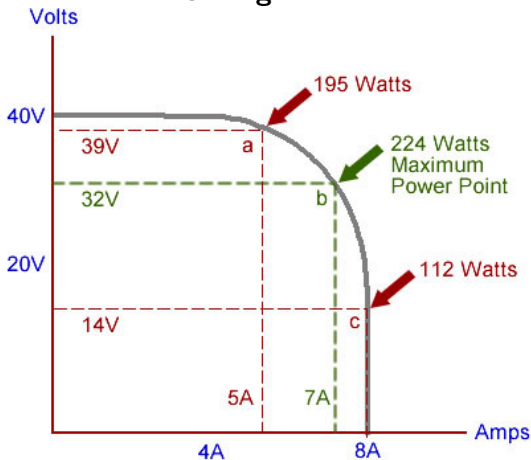
Maximum Power Point Tracking (MPPT) I

Problem statement

Renewable energies are not constant power suppliers. MPPT is a controller, usually an electronic circuit implementing an algorithm to extract the maximum possible power from the renewable energy source at all the times.

Maximum Power Point Tracking (MPPT) II

Defining MPPT
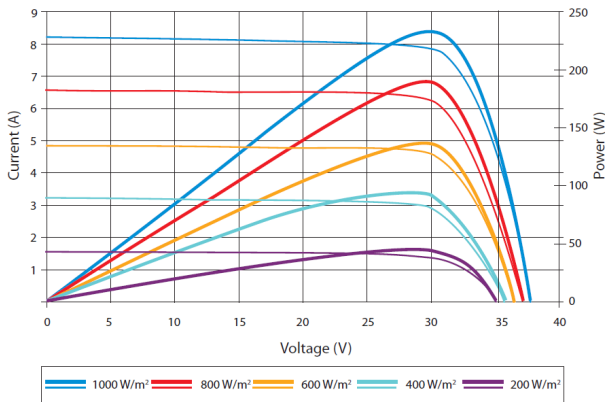

VI (Voltage-current) curve of a battery.

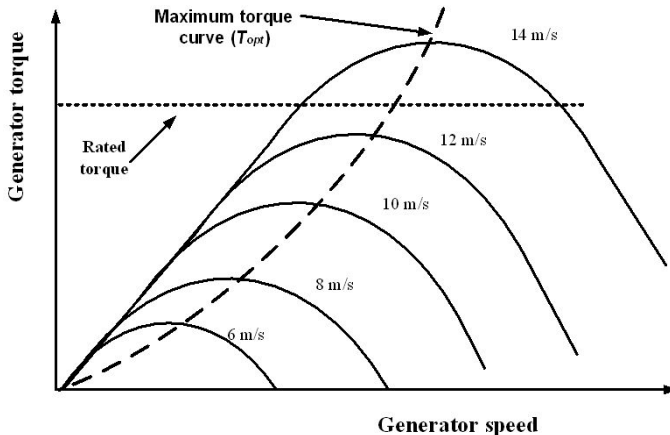# Maximum Power Point Tracking (MPPT) III

MPPT application to the photovoltaic (PV) cells
Current-Voltage & Power-Voltage Curve(230-20)

PV current vs voltage curve at the various solar intensity.

Maximum Power Point Tracking (MPPT) IV

MPPT application to wind mills

Generator speed vs torque curve at the various wind speeds.

Hybrid renewable energy systems (HRES) I

Problem statement

- Providing the solutions to grid independent renewable energy sources.
- Selection of capacity of each power source.
- Optimized switching between different power sources.

Recommended student profile for the admission

- Sciences: Basics of differential equations, basic classical physics
- Technology: Basic analog and digital electronics, control systems
- Computer knowledge: At least one programming language

Compulsory courses required for the master program

- Courses: Advanced engineering mathematics, linear systems, linear algebra, mathematical modeling,
- Seminars: MatLab, real-time systems

Compulsory courses required for the master program

- Courses: Nonlinear systems, stochastic systems, adaptive control
- Seminars: C/C++, Python

Target journals

Journal	I.P.	Review time
Renewable and Sustainable Energy Reviews	7	1-2 years
IEEE Transaction on Industry Application	1.9	>1
Applied Energy	5	≈ 1
Solar Energy	3.7	>1

Examples of research support

- Automation of a process
- Statistical and numerical analysis

Automation of a process

Examples

- Building a custom signal conditioner circuit.
- Process control, i.e. Controlling flow, temperature etc. with high precision.
- Custom experimental setup.

Statistical and numerical analysis

Examples

- Organizing, making a computer program for collecting and processing data.
- Working in parallel to the experimenting professor to provide help with the mathematical part of the article to speed up publications.

Recommended student profile for the admission

- Sciences: Basics of differential equations, basic classical physics
- Technology: Basic analog and digital electronics, control systems
- Computer knowledge: At least one programming language

Compulsory courses required for the master program

- Courses: Advanced engineering mathematics, linear systems, linear algebra, mathematical modeling,
- Seminars: MatLab, real-time systems

Compulsory courses required for the master program

- Courses: Nonlinear systems, stochastic systems, adaptive control
- Seminars: C/C++, Python

Questions?

Thank you for your attention.