Network Control Systems Introduction

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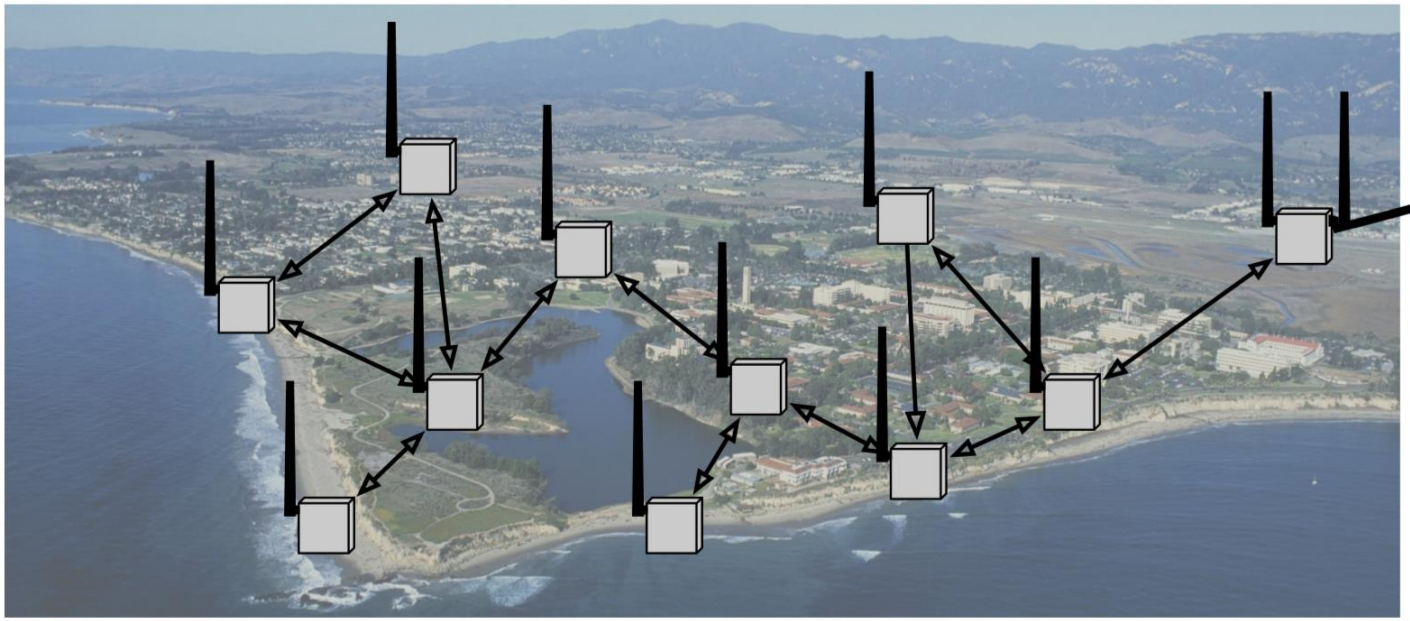
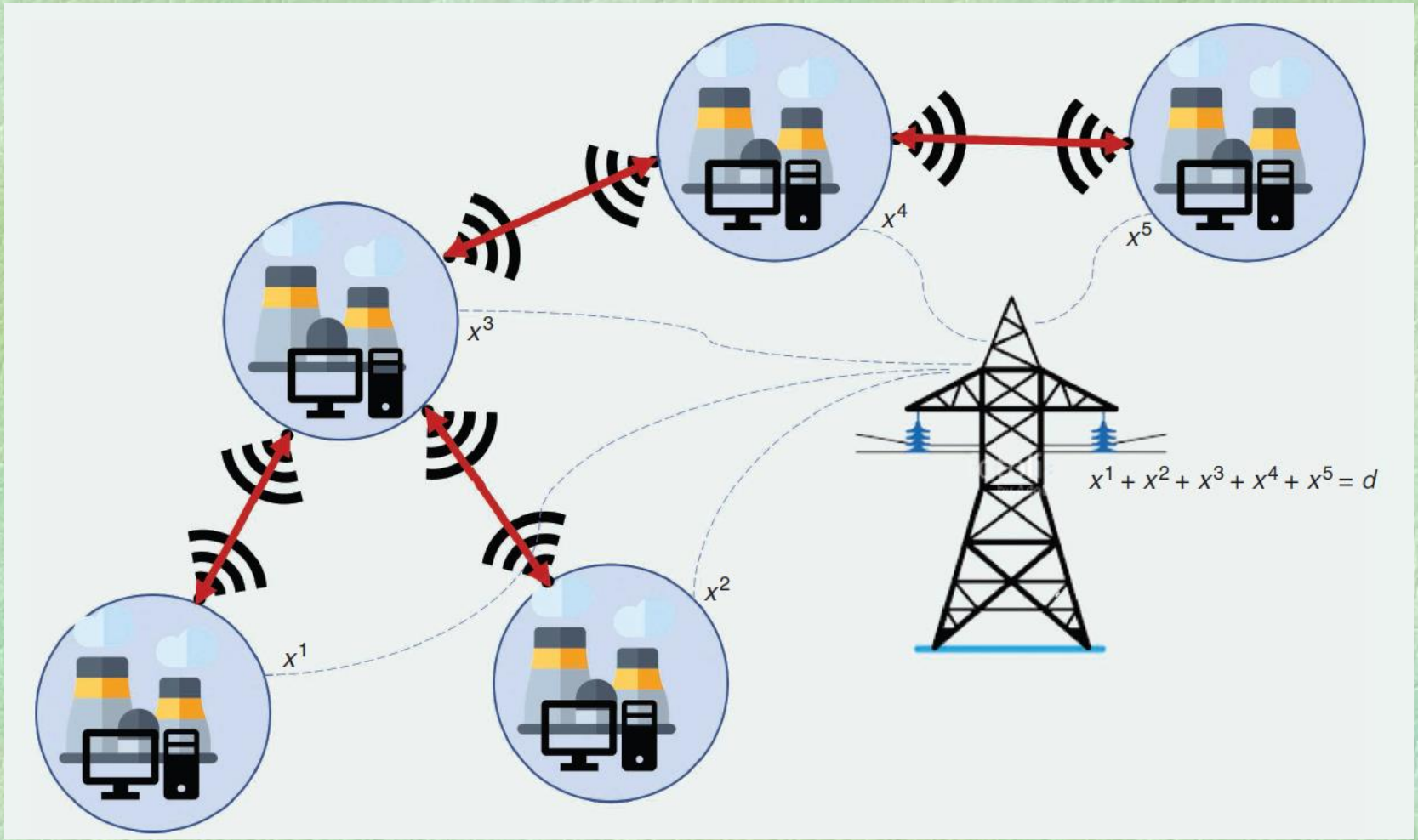
Example of network control systems

Application



Application of Dynamic Average Consensus in Network Systems

- Distributed Resource Allocation

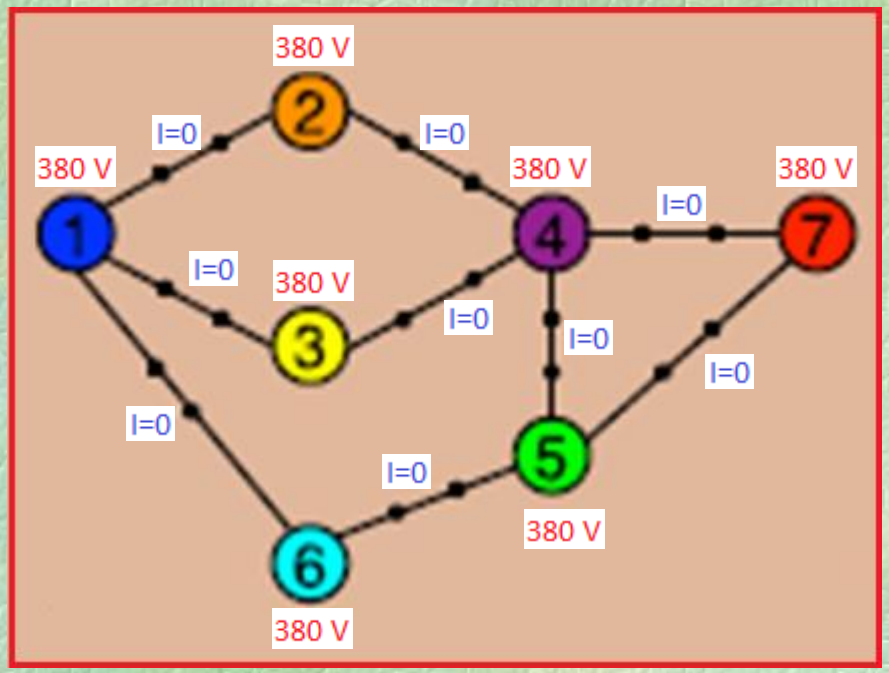


A simple micro grid

Important Problems in DC microgrids:

1) Suitable voltage in nodes.
2) Suitable sharing of current among DGs.
3) Protection and selectivity problems.

Is it possible to set the voltages of different nodes arbitrary?



Of course yes, but there is one problem!!??

Arbitrary bus voltages → Limitation on line current

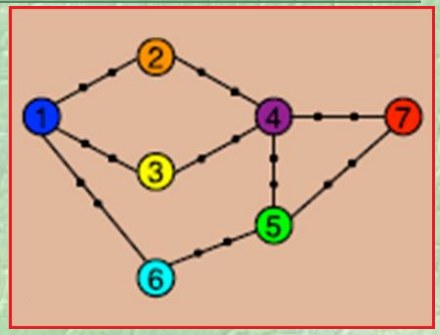
→ Suitable sharing of current among DGs is not possible.

A simple micro grid

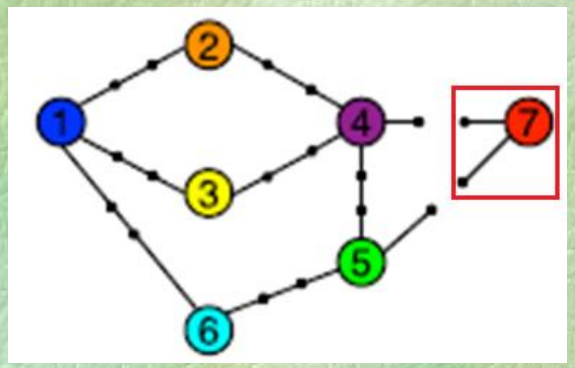
Objectives in Microgrid

1) Suitable voltage in nodes.

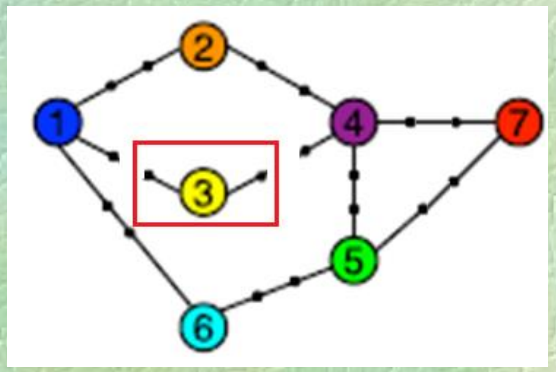
2) Suitable sharing of current among DGs.



Easy plug in:



Easy plug out:



So the researchers try to have following targets at the same time:

Objective 1 (Proportional Current Sharing)

Objective 2 (Voltage balancing)

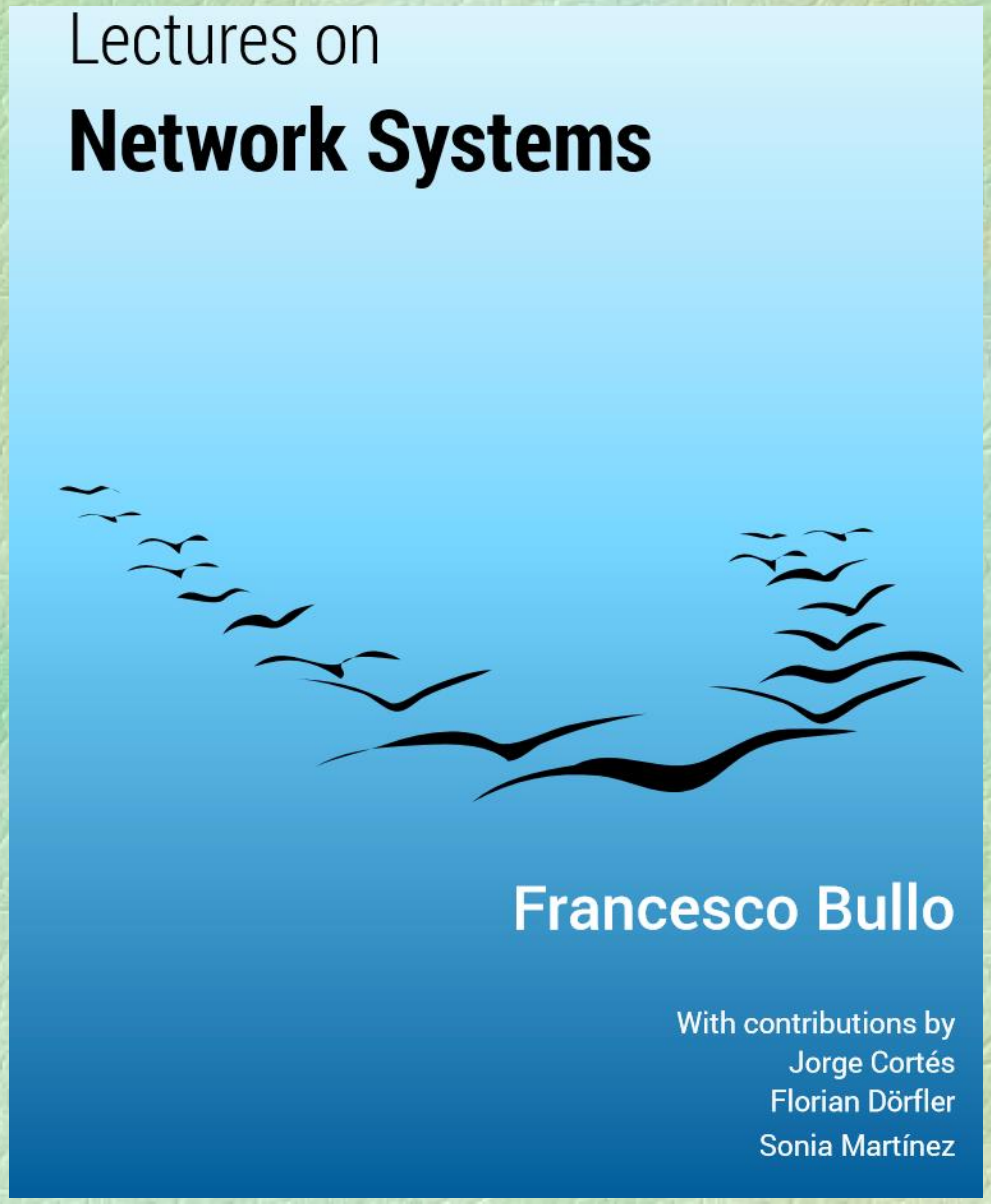
Objective 3 (Easy plug in/out)

Objective 4 Solving protection and selectivity problem

Course Outline

- Graph theory fundamentals.
- Network System Fundamentals.
- Dynamic Average Consensus.
- DC Micro Grid Case Study

References



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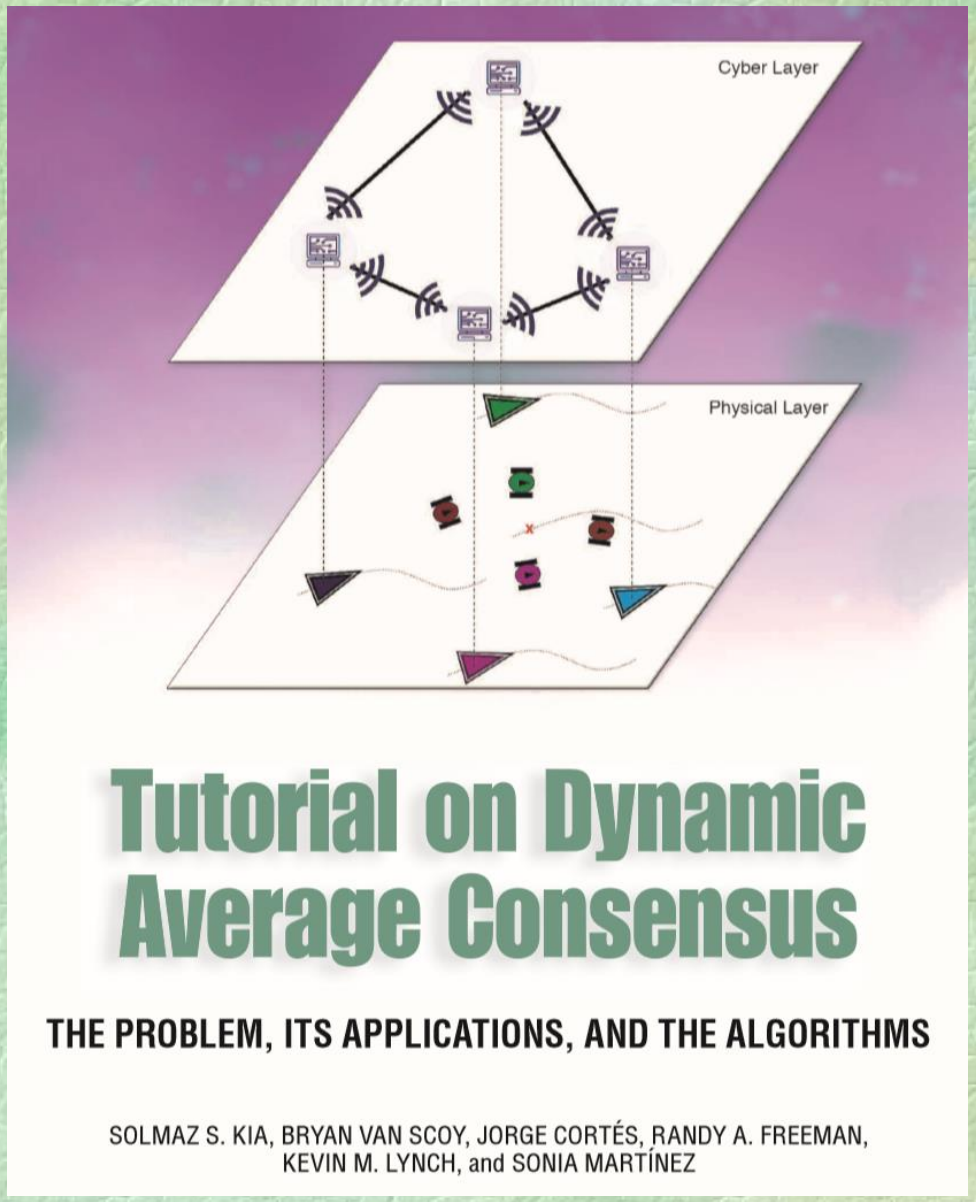

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A. Karimpour*(C.A.), A. M. Amani**, M. Karimpour***, and M. Jalili**

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Stable current sharing and voltage balancing in DC microgrids: A consensus-based secondary control layer☆

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A Consensus-Based Controller for DC Power Networks ⋆

Michele Cucuzzella, Sebastian Trip, Jacquelien Scherpen

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A power consensus algorithm for DC microgrids☆

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Model predictive control of DC microgrids: current sharing and voltage regulation

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