SERVICE DE METROLOGIE NUCLEAIRE
MATHEMATICAL METHODS FOR ENERGY SYSTEMS

MASTER THESES

Academic year **2021-2022**

*The topics listed below correspond more to **themes** in which master theses can be realized, than to a detailed description of topics. Depending on the interest of the students, more theoretical or instead industry-related topics will be developed. Some of the proposed themes are more convenient for an internship, to be made before the master thesis.*
*The themes proposed are preferably **accessible mainly to students in engineering physics and in electromechanical engineering**.*

10. Identification of underperformances using a Bayesian approach (in collaboration with Engie Laborelec)

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Context: In the important context of the energy and environmental transition, we consider a photovoltaic production farms where multiple assets (PV panel strings) are naturally exposed to similar irradiance conditions. In general, the production of these assets should be similar. It is however possible that some of these assets are presenting underperformances.

Objective: We are doing the assumption that only the asset production measurements (kW) are available. In particular we don't have any reliable irradiance measurement. We would like to identify the underperforming assets.

Approach: By doing the assumption that only a fraction of the assets are underperforming simultaneously, it seems natural to identify the underperformances by comparing each asset with a reference obtained using all assets. In practice the situation is a little more complex (missing data, assets having different nominal powers, partial shadowing of some PV panels…). We will focus on a Bayesian approach (MCM) for this problem in order to easily include expert knowledge via the "a priori" distributions, and to obtain a confidence interval on the "a posteriori" distribution of the underperformances