

**SERVICE DE METROLOGIE NUCLEAIRE**  
**RELIABILITY AND SAFETY OF POWER 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**.*

**2. Probabilistic security assessment as a tool for transmission operation**

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The security of a power system is its ability to withstand disturbances arising from faults and unscheduled removal of bulk power supply equipment without further loss of facilities or cascading outages. The security analysis of the transmission grid requires both deterministic and probabilistic approaches. The "N-1 security rule" is the deterministic approach classically used by Transmission System Operators for network planning and real-time operation. This rule relies on the assumption that an electrical grid will be secure if it stays electrically stable after any single failure among the N initially active network elements. Probabilistic studies can then complement (or replace?) this deterministic approach to assess the residual risk of cascading outages leading to an important amount of loss of load and to identify corresponding accidental scenarios. This MSc thesis will study how a probabilistic approach can be used in complement of or instead of a deterministic approach to optimally ensure a high security of supply in operation (e.g. through redispatch actions).