in the intervals where the reference rotational speed is greater than the synchronism speed, the electric machine operates in generator mod.

We can also note that there are several intervals where the energy supply provided by each of the turbines, is insufficient for the operation in the generating regime of the electric machine; in this case it is necessary whether to disconnect the electric machine from the network to avoid risks operation or to add a storage and boost energy units to overcome voltage drop problems.

In this stage of the concept development, of electromechanical coupling between wind and tidal, the unit controlled electric drives are used to emulate wind and tidal turbines. These structures control were chosen during the design and the choice of the equipment and components of the emulator. In both mode of operation (hybrid system or separated systems), vector control ensures a preliminary validation and reliability of the electromechanical coupling of two renewable energy sources of different dynamics. Future development will focus on a complex control structure that must allow the fault-ride capability operations of the system and its connection to smart grids [11] [12].

6. Conclusions

The aim of this work is to present, on one hand, a methodology called ñaccelerated simulation timeò and its experimental validation, and on the other hand, to present the flexibility of a multi-function emulator, that allows various emulation architectures: wind turbines, tidal turbines, hybrid wind - tidal turbines systems.

It is shown by software simulation and experimental simulation that, the number of samples or time of sampling can be reduced. And as result, the simulation time is reduced with good estimation result obtained.

We obtained practically the same average values of power and rotation speed, with differences not exceeding 5%. This allowed us to save time in simulation and calculation. This methodology could be implemented for advanced control using previsional data of wind and tidal sources.

In the second part of this work, we presented various variants of experimental turbine emulation, based on the HILS concept (Hardware In the Loop Simulation) used in the GREAH laboratory.
Furthermore, hybrid wind-tidal turbines emulator system is experimentally performed, where two turbines are coupled on the same shaft along with Doubly-Fed Induction Generator (DFIG).

The main objective is to study this concept of electromechanical and its impact on the output power of the system; the obtained results are correlated with wind and tidal speed profiles, in which statistical properties impacting global power chaine could be complementary and in particular in function of the given sites.

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