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Thu-Mo-Or18-05: New Type of Linear Switched Reluctance Generator for Wave Energy Applications

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One promising source of clean and efficient energy comes from the ocean waves since they transport a considerable amount of energy. In the recent years there have been many highly scientific proposals for harvesting this energy in an efficient manner but in any case one of the key points to guarantee such efficiency is the selection of the PTO (Power Take Off). This conversion process is characterised by a significant fact: To achieve a considerable amount of power and since the moving speeds are low, the involved forces must be very high. On the other hand, the higher the number of conversion stages in the generation process, the lower becomes its efficiency. In this regards the ideal converter would be a very powerful single stage machine (direct drive). Electrical machines automatically fulfil the condition of a single stage conversion but lack of the capacity for producing the higher forces that can be achieved with hydraulic actuators.
Some years ago some of the authors developed a high force density machine based on the switched reluctance principle, more reliable, robust and especially suitable for long stroke applications. A prototype was built and tested in the lab and then hosted in a so call “point absorber” and launched into the sea for producing energy. Now the authors have proposed a novel topology of a Switched Reluctance Machine for making more efficient machines increasing its force density in order to harvest more energy from a certain wave. The idea constitutes the basis of a project which was presented to an H2020 RIA (Research & Innovation Action) type call and approved and which is now on-going. The design of a prototype is about to be finished and the construction will start in the next months.
The paper will describe the concept of the machine and its design as well as the foreseen applications in the framework of the project and beyond.

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