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Moving Coil Coreless Linear Generator for Wave Energy Conversion

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Ocean waves are a huge largely untapped energy resource, and the potential for extracting energy from waves is considerable. Research in this area is driven by the need to meet renewable energy targets, but is relatively immature compared to other renewable energy technologies. The project is based on wave energy conversion by L.G. The possible power take-off systems are identified to enhance the efficiency of point absorber-type WECs. There is a lack of convergence on the best method of extracting energy from the waves and, although previous innovation has generally focused on the concept and design of the primary interface, questions arise concerning how best these systems are. In this project, we outlined the performance and FEM model of a prototype coreless moving coil permanent magnet linear generator machine with an air-cored stator. The main application of the machine is in direct drive marine energy conversion systems, where are wave energy in the region of 0.5 m. A simple analytical method was derived to provide an initial design of a prototype machine, which was then modeled using 2D Maxwell finite element analysis. Experimental results are presented to verify the design, and to investigate the performance of the machine as a generator. Linear Generators are used to convert the linear motion directly into electromotive force (EMF). In conversion from linear to rotational tremendous amount of energy is lost and hence the conversion efficiency of rotary is less as compared to linear generator. In this project the permanent magnet arranged as stationary and coil is moved through the magnetic field which generates EMF. The movement of coils is performed by buoyancy mechanism of the sea waves. The EMF generated is 6 Vp-p according to finite element simulation software. The prototype is able to generate EMF of about 2.5 Vp-p. Project concludes with some suggestions for future developments.