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## Application of a Passive Control Technique to the ISWEC: Experimental Tests on a 1:8 HIL Test Rig

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In this work, we address the use of Hardware In the Loop test rig for renewable energy application. Such test rig is designed to evaluate the performances of the wave harvesting system called ISWEC.

The ISWEC is a floating, slack-moored, gyroscopic Wave Energy Converter. The full-scale prototype has an electric-mechanical Power take-off (PTO) composed by a gearbox and a brushless torque motor. The system is torque controlled to keep the gyroscope in the desired position range and to obtain maximum productivity. In order to obtain this, two different control methods are under study: a proportional-derivative (PD) law and a passive control method. The PD control law regulates the torque on the PTO providing a stiffness term to recall the gyroscope in the vertical position and a damping term to extract power.

In this configuration, the PTO performs the recall effect, resulting in an increase of the torque load. To overcome such problems, the use of an eccentric mass to provide the stiffness term is analyzed.

The experimental tests demonstrate the reduction of the PTO torque, justifying the gap in the system productivity provided by the passive control as assessed with the numerical model.

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