New system to harness energy from ocean currents

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Researchers at the UPM, within the framework of PROCODAC-GESMEY project, have participated in the construction and testing of the prototype of a device to harness energy from ocean currents able to work in deep water.

In collaboration with the Astilleros Balenciaga company and the Fundación Centro Tecnológico Soermar, researchers at the Group of R&D GITERM, assigned to the Higher Technical School of Naval Architecture and Ocean Engineering of the Universidad Politécnica de Madrid, are participating at the PROCODAC project, focused on the design, construction and testing on a marine environment of an experimentation prototype at a ten to one scale of what would be an industrial unit able to provide a 1MW of electricity (GESMEY project). This prototype is complemented by an underwater buoy that was designed to operate in areas of 40 metres of depth.

The test results were very successful and have confirmed that this prototype can produce the expected energy and to be maneuvered by remote control, what can be of interest to use it in future underwater power plants.

Today, to harness energy is an issue of interest, particularly those related to sea. The first generation of systems of harnessing energy from ocean currents was only feasible in areas of maximum depth of 30-50 metres (because the generators were joined at the bottom) and its maintenance was expensive. Consequently, second-generation systems came out:

anchoring systems with diverse solutions that allow us a submerged operation with the possibility to put afloat the main elements for its maintenance.

The tested prototype of the GESMEY project belongs to these second-generation systems, the design is protected by patents and the co-owner is the Universidad Politécnica de Madrid within a Framework Agreement signed between UPM and Soermar.

The main unit of the prototype includes, as we can see on the image, a structure of stainless steel with a central body and three peripheral parts joined by arms. The generator, the multiplier, and the instrumentation system are inside while the rotor that captures ocean currents is outside.

During the development of the project, tests of integration and the tune-up were conducted in the LEEys Lab of the ETSIN and at the shipyard. They also conducted sea trials divided into tests of maneuvers and trailer. The project was complemented with a research on hydrodynamics and structures as well as maneuvers and energy control. These studies were embodied in various numerical simulations.

The test results were very successful and have confirmed that the prototype has accomplished their objectives by reducing costs of construction, installation and maintenance. In addition, the development and construction of these units of marine renewable energy production are affordable for a medium sized shipyard.

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