

New Type of Wave Energy Converter

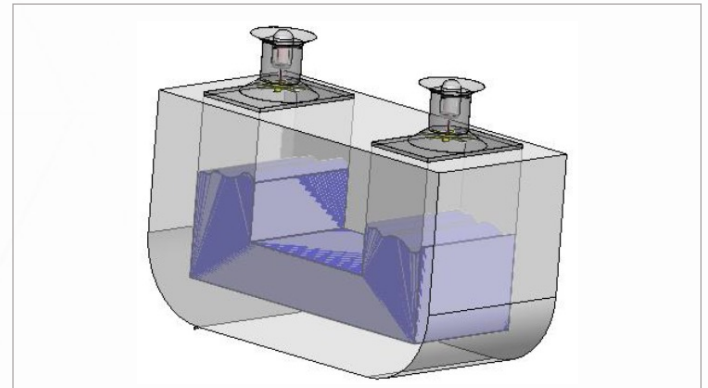
VTIP 21-031: “Offshore Wave Energy Converter with Pitch Resonance Tuning Tanks and Pneumatic Turbines”

THE CHALLENGE

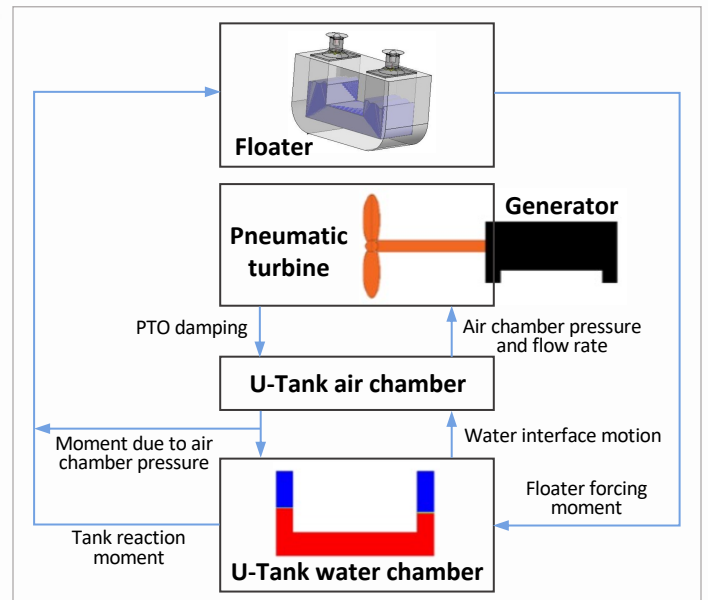
As global demand for energy rises, the ocean holds potential to provide a renewable energy source. Engineering solutions to harness this energy remain challenging due to the corrosive ocean environment and the complexity of wave energy converter designs which can complicate maintenance of the devices.

OUR SOLUTION

The Brizzolara lab at Virginia Tech has designed a wave energy converter which has been theoretically verified to be able to harness ocean waves in an efficient and environmentally stable manner. The converter has the advantages that it is simple in design and has few parts exposed to the corrosive ocean water environment, greatly reducing maintenance and operational expenses. The energy conversion process is the result of the coupling of three dynamic systems whose natural frequency can be easily tuned in order to reach max conversion efficiency in a large range of prevalent wave periods.



Schematic for the wave harvesting device characterized by a pitch resonant tank partially filled with water. As the device oscillates in the waves, air is forced in and out of the openings at the top which drives a pneumatic turbine.



Schematic of the subsystems of the integrated thermo-hydrodynamic non-linear coupling of the pitch resonant tank wave energy converter. Shown are the main variables coupling each subsystem dynamics.



CONTACT:

David Irvin
davidi86@vt.edu
 540-231-7376