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Energy Harvesting from Mangrove-like Structure in Tandem and Staggered Arrangements.[1] EDUARDO E. CASTILLO, Assistant Professor, Universidad Ana G. Mendez, DANIEL O. GOMEZ VAZQUEZ, Undegraduate Student, Universidad Ana G.Mendez, AMIRKHOSRO KAZEMI, Post Doctoral Research Associate, Florida Atlantic University, OSCAR CURET, Assistant Professor, Florida Atlantic University — This work investigates the performance of a mangrove-inspired structure that uses vortex induced-vibration to harvest hydrokinetic energy. The device consists of a coil and magnets attached to a vertical wood cylinder submerged in water and connected to a thin steel plate. This cantilever configuration allows only oscillations perpendicular to the flow. Three independent devices were placed in tandem and staggered arrangement in a water tunnel to measure the power generation and the kinematics of the three devices. Reynolds numbers ranged from 200 to 1500, based on cylinder diameter. It was found that the energy generated was proportional to the oscillation's amplitude. The results show that in both arrangements as the velocity of the flow increases, the amplitude of oscillation increases from cero to a region with high values to then decrease to cero for high velocities. The up-stream device shows a delay in that behavior, compare to the other devices, but reach higher frequency of the oscillations. Additionally, we measured the flow structure to explore the hydrodynamic interaction within the devices. These renewable energy devices could have applications to power small actuators or sensors to monitor coastal infrastructure.

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