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Experimental Validation of a Theory for a Variable Resonant Frequency Wave Energy Converter (VRFWEC) MINOK PARK, LOUIS VIREY, University of California, Berkeley, ZHONGFEI CHEN, Harbin Engineering University, SIMO MKIHARJU, University of California, Berkeley — A point absorber wave energy converter designed to adapt to changes in wave frequency and be highly resilient to harsh conditions, was tested in a wave tank for wave periods from 0.8 s to 2.5 s. The VRFWEC consists of a closed cylindrical floater containing an internal mass moving vertically and connected to the floater through a spring system. The internal mass and equivalent spring constant are adjustable and enable to match the resonance frequency of the device to the exciting wave frequency, hence optimizing the performance. In a full scale device, a Permanent Magnet Linear Generator will convert the relative motion between the internal mass and the floater into electricity. For a PMLG as described in Yeung et al. (OMAE2012), the electromagnetic force proved to cause dominantly linear damping. Thus, for the present preliminary study it was possible to replace the generator with a linear damper. While the full scale device with 2.2 m diameter is expected to generate $O(50$ kW), the prototype could generate $O(1$ W). For the initial experiments the prototype was restricted to heave motion and data compared to predictions from a newly developed theoretical model (Chen, 2016).

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