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## Tank testing of an inherently phase-controlled Wave Energy Converter

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### Abstract

Results from laboratory experiments on a pre-tensioned heaving buoy of 8.4 m diameter, tested at scale 1:16 is presented. The wave energy converter, which is under development by the Swedish company CorPower Ocean, is designed with a passive pneumatic machinery component referred to as WaveSpring, invented at NTNU. The negative spring arrangement inherently provides phase control. The power take off system and the effect of the phase-enhancement component was represented by a motor rig run with a force-feedback controller. Responses with and without the WaveSpring unit were measured in order to compare performance in terms of motions, loads and power absorption.

The experiments included decay tests, radiation tests, irregular wave tests with the system in normal operation, as well as extreme wave tests with the system in survival mode. The power was extracted through a linear damping force, where the damping coefficients were set close to their theoretical optimum for the heave mode.

The results show that with the WaveSpring component, the system is able to absorb three times more power in realistic sea conditions than without it.

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