

89c89
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99c99
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105c105,109
< MBARI has been developing a wave-energy conversion buoy specifically for powering oceanographic instrumentation. The resulting device is a two-body point absorber in which a power take-off device connects a surface buoy and a submerged anti-heave plate (see figure \ref{fig:MBARI_WEC}). The relatively low average power level requirements (300-500\,W) and small size make this system distinct from the larger wave-energy conversion devices currently being explored for utility power applications. Nevertheless, it is still important to develop as much power as possible from these systems with respect to their size and weight. The work presented here is the result of a collaboration between MBARI and IDMEC-IST intended to utilize the computational tools present at \mbox{IDMEC}-IST to explore advanced control schemes (latching in particular) to increase the amount of power captured by the MBARI system. Up to the point of this work, the MBARI system had been deployed only with a linear damping scheme in which the power take-off machinery exerts a force that is proportional to the relative speed between the surface buoy and submerged plate.

> The Monterey Bay Aquarium Research Institute (MBARI) has been developing a wave-energy conversion buoy specifically for powering oceanographic instrumentation. The resulting device is a two-body point absorber in which a power take-off device connects a surface buoy and a submerged anti-heave plate (see figure \ref{fig:MBARI_WEC}). The relatively low average power level requirements (300-500\,W) and small size make this system distinct from the larger wave-energy conversion devices currently being explored for utility power applications.
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> The future holds many ambitious projects for oceanographic data-acquisition systems. At-sea charging stations for autonomous underwater vehicles (AUVs) and autonomous un-moored platforms for extended deployments are examples of such projects that are underway and that we will likely see come to fruition in the coming years. The development of energy harvesting techniques for these systems is important and we aim to advance those efforts. In spite of the relatively small absolute energy levels this sort of system operates at, it is still important to develop as much power as possible from these systems with respect to their size and weight and the study presented here explores optimization techniques for that reason.
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140c144
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158c162
< \item mass: $m_3 = 972\,\text{kg}$;

> \item mass: $m_3 = 970\,\text{kg}$;

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177c181
<      \item absolute pressure: 5.17\,bar;
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>      \item absolute pressure: 5.2\,bar;
182c186
<      \item absolute pressure: 8.69\,bar;
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>      \item absolute pressure: 8.7\,bar;
193c197
<      \item 6 DOF GPS aided IMU to measure the buoy motions and location;
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>      \item 6 degree-of-freedom GPS aided inertial measurement unit to measure the buoy motions
and location;
470c474
< \caption{Mean power conversion,  $P_{\text{mean}}$ , as function of  $\lambda$  and  $C_{\text{sys}}$ 
, for each of the May spectra.}
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> \caption{Mean power conversion,  $P_{\text{mean}}$ , as function of  $\lambda$  and  $C_{\text{sys}}$ 
, for each of the May spectra. There is no field test result for (f) because waves in this he
ight range did not occur during the deployment period.}
648c652
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charging stations for autonomous underwater vehicles (AUVs) and autonomous un-moored platforms
for extended deployments are examples of such projects that are underway and that we will lik
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for these systems is important and we aim to advance those efforts. In particular, this work
has illustrated that for small wave-energy harvesting systems of this type, the most expedient
way to increase the power capture is to increase the size, mass, and drag of the submerged el
ement of the system and utilize simple linear-damping power take-off devices. The limits to t
his approach become the large peak loads that result and the implications for storm survivabil
ity. The natural development path is towards compliant sub-surface heave plates that can exer
t large inertial and drag forces in moderate sea states but that can shed power in larger sea
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