

## TECHNOLOGY SOLUTION

### Mechanical and Fluid Systems

# Ocean Platform Motion Control

## Leveraging Water Ballast to Control Dynamics in Floating Structures

NASA engineers have developed a new approach to mitigating unwanted motion in floating structures. Ideally suited to applications including offshore wind energy platforms and barges, the innovation uses water ballast as a motion damping fluid. Various designs have been developed to suit a number of different configurations depending on the specific applications. To date, target applications have included floating offshore wind energy platforms and service barges. Prototypes have been developed and tested as part of DOE's ATLANTIS floating offshore wind energy development program and have demonstrated highly effective control of the platform motion induced by wind and wave action. This innovation builds upon extensive expertise of the NASA innovators in developing novel vibration and motion damping control methods for various NASA large-scale structural applications.

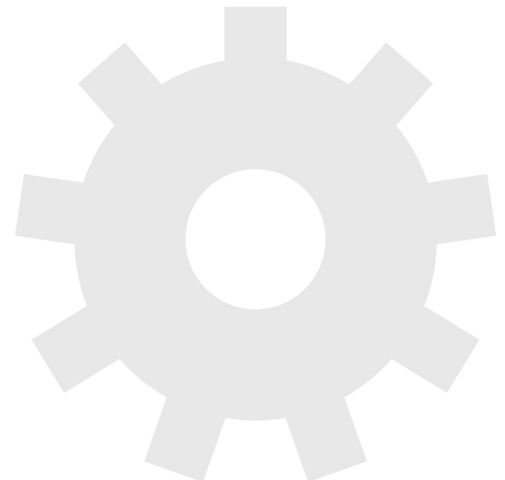
### BENEFITS

- Simple: Systems are simple in design and easy to manufacture, transport and install.
- Broadly applicable: Systems can be designed and integrated into the build of a primary floating structure or can even be implemented on existing maritime platforms and vessels.
- Experimentally Validated: Tests of prototypes have shown excellent motion control effectiveness.

### APPLICATIONS

The technology has several potential applications:

- Offshore floating wind energy platforms
- Barges and ships
- Other floating maritime structures

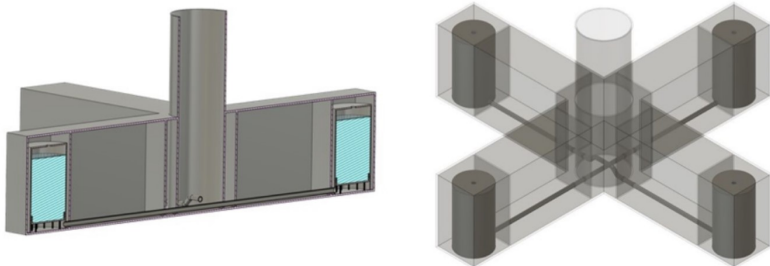


## THE TECHNOLOGY

The NASA innovation leverages existing ballast fluid of a maritime structure to proactively mitigate undesirable resonant response characteristics of the platform or vessel. Essentially, this innovation couples water ballast as a functional working mass to the dynamic motion of a floating structure in order to provide passive motion management of the primary structure.

The system can be implemented pre-design or post manufacture. The systems are simple and are easily manufactured, transported, and implemented onto a primary structure.

The NASA technology has been designed (patents applied for) for a range of platform designs and can be further customized depending on the final application requirements. Prototypes have been built and tested in a wind-wave tank test bed at the University of Maine.



Schematics showing water ballast tanks used for motion damping of a floating platform structure.



Wind turbine that could be supported on a stabilized floating platform.

## PUBLICATIONS

Patent No: 11,623,715; 11,618,535; 11,279,452

Patent Pending

[technology.nasa.gov](https://technology.nasa.gov)

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