

HELIOFLOAT – A floating lightweight platform

Lies calmly and safely on top of the water – even when seas are rough. Cost efficient and self-stabilizing – effective for solar energy, sustainable aquaculture, and sports & culture.

In large-scale solar energy applications, for example with photovoltaics or collectors, support structures represent a considerable cost factor, particularly if they are to follow the sun.

It is therefore a simple step to reach the idea of making solar power plant that float, since an entire collector array could then be easily rotated.

Conventional floating platforms, on ships or closed flotation devices, must have a very massive construction system in order to prevent kinetic wave energy from causing structural damage. This is not financially feasible for most solar energy applications.

Objectives

Prof. Markus Haider and colleagues at the Institute for Light Construction and Structural Biomechanics of the TU Wien joined together to develop a lightweight support structure able to float calmly, even in strong waves. It needed to be affordable to accommodate cost-efficient implementation for solar energy use and other applications.

Approach

The basic idea was not to build a conventional platform, buoyed by water displacement, but instead to let it hover above the water on air cushions.

The Heliofloat's air cushions make it possible to decouple the platform from the swell of the sea. Flat, open cylinders made of a soft, flexible material have been added in a lower layer, increasing buoyancy. In the upper section, air that cannot escape makes the cylinder float, while towards the bottom the air comes into direct contact with the water. Instead of sealed air cushions, air columns atop the water act as shock absorbing units. The flexible side walls of the "buoyancy barrels" are only minimally impacted



Solar power and water desalinization plant (4 x 300 x 300 m)

by horizontal force, which has significant potential to damage conventional floating structures.

The potentials and limits of this construction have been wave-impact and stability tested, analyzed, modelled, and calculated. The attained results have been tested and confirmed by experiments in a shipbuilding laboratory.

Results

We now have a construction that is very light and slender and can be manufactured from conventional materials in a base size range of approximately 30 x 30 m to 100 x 100 m. Modules can be connected to form larger areas. The resulting platforms remain calm and stable on the water, even in rough weather.

The platform does not prevent the surface of the water from exchanging gases with the air – neither on the interior, nor on the exterior of the buoyancy barrels.

To ensure that aquatic life is only minimally impacted, HELIOFLOAT platforms are made partially transparent, translucent, meaning that sunlight is not blocked from entering the water.

Benefits

HELIOFLOAT opens up entirely new perspectives for energy and aquatic industries, as well as for seawater desalinization and the sustainable industrial use of oceans and seas, from aquaculture to alga farming.

In arid areas, HELIOFLOAT can significantly reduce evaporation from bodies of water such as lakes. Evaporation is reduced within the flotation cylinders, where saturation vapor pressure is limited, thus minimizing the overall evaporation surface.

It is also possible to build sports and leisure activity facilities – and, in the future, possibly even residential housing that floats upon the water.

HELIOFLOAT is a spin off of the TU Wien and – together with the TU Wien – is gladly available as a partner for project collaboration.



HELIOFLOAT opens up new opportunities and perspectives



A single platform module –
adaptable to load weight and height adjustable

Applications

HELIOFLOAT platforms are particularly well-suited as support structures for:

- Solar power plants (photovoltaic and heliothermal)
- Alga bioreactors for water-efficient biomass extraction from saltwater
- Thermal saltwater desalinization – especially when water must be both desalted and purified of contaminants.
- Reduction of water evaporation, enabling increased agriculture and solar power gains. New opportunities: it is not so much the costs for 1 m³ of water but the value creation of 1 m³ of water!
- Additional applications for which newly created, low-cost surfaces are needed – for example, as infrastructure for sports, leisure, and cultural activities, for manufacturing, or for residential use.

Notes

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