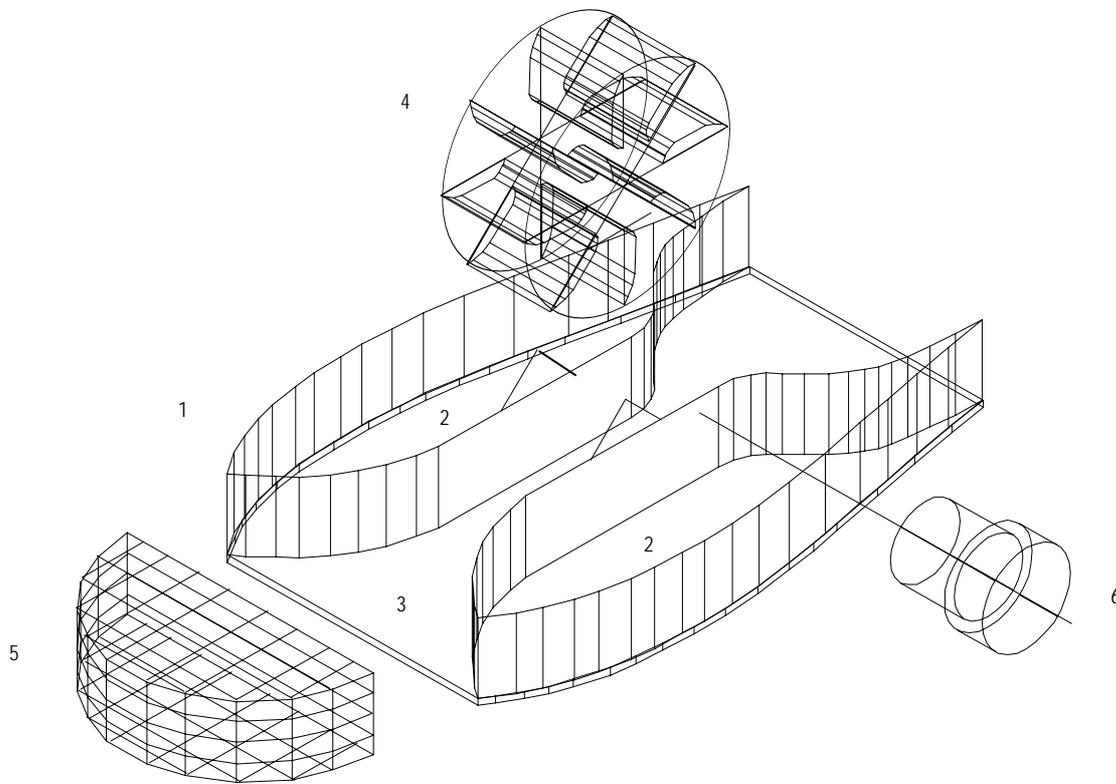
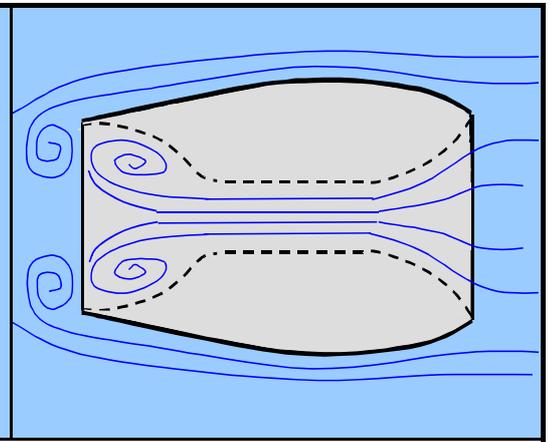


Catamaran for creating a net head  
Forming Planar Symmetry Channel with  
“Hidroreactor” profile to promote power  
extraction from run-of-river streams



Legend:

- 1 - Catamaran with “hidroreactor” profile for creating a net head
- 2 - Profiled floats
- 3 - Floor blade
- 4 - Low head water wheel
- 5 - selective grid at the channel inlet to avoid entrance objects bigger than a specific size
- 6 - Electrical generator

**Patent Applications:**

EP – 05398005.8 / Date 07-Jun-2005

[www.peehr.pt](http://www.peehr.pt)

Rua Nova No 2, Areia Branca, 2530-065 Lourinhã, Portugal

**PEEHR**  
rodutora de Energia Eléctrica por Hidro-Reacção, Lda.

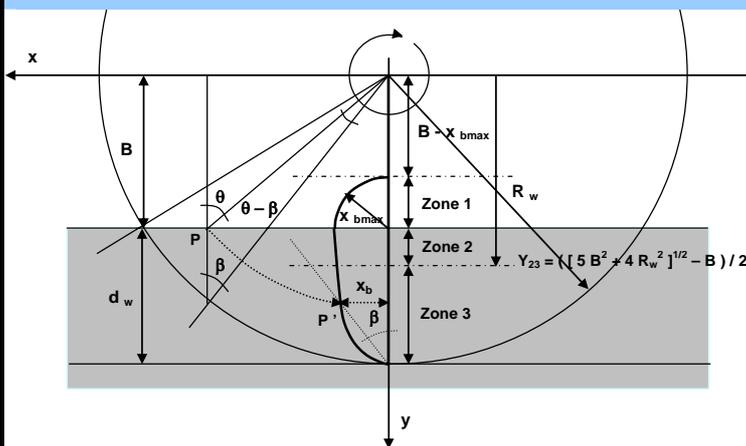
## Application:

Catamaran with profiled floats forming a planar symmetry channel of “hydroreactor” profile, to be installed in places with streams at low depth rivers, where nautical traffic is almost inexistent



## Advantages:

- The catamaran consists on an highly efficient stream accelerator, with two profiled floats forming a planar symmetry channel of “hidroreactor” profile, that introduces a significant net head generating a flow of higher loading than the stream - promotion of power extraction from the streams on a higher number of sites.
- The two floats corresponding to the edges of the channel are connected together with a floor plane corresponding to the floor of the channel - the floor plane reduces the loss of pressure in the channel.
- The flow of water is performed on a free way, without the need of constructing dams with creation of small lakes.
- The catamaran is easily installed, fixed to the riverbed by means of stakes.



In the narrower channel zone works a **low head water wheel**

that drives

one or more **synchronous electrical generators** located on the top of the floats.

The water wheel buckets were designed to get the best efficiency with low fall streaming flows.

The bucket surface curvature in zone 3 is such that the bucket surface at this zone is always perpendicular to the water surface when the bucket is on the ascending phase to leave water surface.

## **Experimental results from testing scale models containing a narrower channel width of 300 mm have shown that:**

The flow velocity through the narrower channel zone in the absence of any flow constraints is about 40% higher than the outside stream velocity, meaning that the available loading there is about 2 times higher than the stream loading and thus the available power flux density is about 2.75 times higher.

Conversion of power is possible for stream velocities above 1 knot (0.5 m/s).

The ratio between the flow velocity through the channel narrower zone and the stream velocity, in the absence of any flow constraints, remains constant for typical streams velocities – The accelerator acts with the same performance in places of high streams.



Narrower Channel Width	Maximum distance between the floats external surface	Channel length	Water wheel diameter	Nominal Power at 4 knots (2 m/s) stream	Nominal Power at 6 knots (3 m/s) stream
1 m	4.6 m	7 m	2.3 m	6 kW	22 kW
1.5 m	6.75 m	10.5 m	3.5 m	9,5 kW	33 kW
2 m	9 m	14 m	4.7 m	13 kW	44 kW
1.2 m	5.4 m	8.4 m	2.8 m	7,5 kW	26 kW

**The first commercialised units will have a narrower channel width of about 1.2m, a water wheel with 2.8m diameter and a nominal power of 15 kW expected for a 5 knots (2.5 m/s) stream.**