

INTRODUCTION

The most common wave absorbers (generators) in use today are simple float devices using a generator to provide the electrical power to light a navigation buoy. The use of a buoy or other floating body is not the most efficient means of extracting energy from a wave, but it does represent one of the simpler methods.

The engineering analysis of the energy that can be extracted from a wave using a float device is interesting and well within the means of undergraduate students. Conducting the experiment provides a simple introduction before the more complex issues involved with other wave absorbers.

In full-scale applications float devices are either used to drive, directly, an electrical generator or to compress a hydraulic fluid, in turn used to drive a generator. At a laboratory scale the inefficiencies in either of these methods complicates the analysis. Cussons P6330 Floating Body Wave Absorber is designed to operate with a special pump that provides an easily variable load and measurable output.

P6330

Wave Absorber

Float Design

and P6331

EXPERIMENTAL CAPABILITY

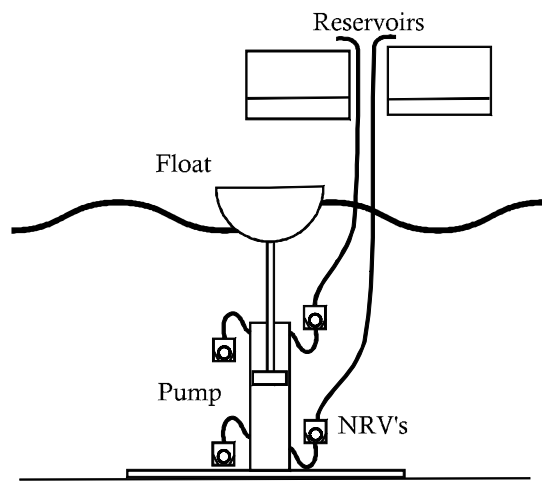
The P6330 Floating Body Wave Absorber allows experiments related to the following topics to be conducted

- ◆ The energy available from a wave
- ◆ Buoyancy and Archimedes principle
- ◆ Relationship between wave form and buoyancy
- ◆ Potential Energy in a fluid
- ◆ Float shape in determining energy extraction

DESCRIPTION

Cussons P6330 Floating Body Wave Absorber is designed for use in a wave channel with a depth of at least 220mm and wave heights of up to 100mm. Water depths of greater than 280mm will require the user to provide support blocks on which the wave generator can sit. It is particularly suited for use within Cussons P6275 5m Water Flow Channel (300mm wide) and Cussons P6285 Regular Wave Maker for 300mm channel.

The wave absorber comprises of a double acting water pump, able to extract a variable amount of energy from both the up thrust of the wave on a float, and from the descent of the float under gravity. The interchangeable float is connected via a single straight drive shaft to a piston running within a vertical cylinder. Special low resistance Non Return Valves (NRV's) allow



P6330 Float Wave Absorber

water to be drawn into the upper side of the cylinder as the piston descends, whilst at the same time pumping water from the lower side of the cylinder up one outlet pipe. As the piston rises the NRV on the inlet to the upper side of the cylinder closes whilst the outlet NRV opens as water is pumped up the second outlet pipe. Similarly in the lower side of the cylinder, as the piston rises, the outlet NRV closes and the inlet NRV opens to admit water.

The outlet pipes are routed to two reservoirs mounted on an integrated support stand. The height of the reservoirs can be adjusted so that a variable head, (and hence a variable load) is applied. The amount of water collected over a number of wave cycles can be measured. It should be noted that as a relatively low head of water is pumped the resistance of the NRV's must be very low, and hence some leak back is inevitable. The efficiency of the absorber is therefore not accurate, but the engineering principles can still be studied and applied consistently. The pump and float are all made from plastic eliminating rust. The float is supplied with a pocket to which weights can be added. Three 200g weights, a 100g weight and a 50g weight are provided.

TENDER SPECIFICATION

The P6330 Floating Body Wave Absorber is to provide experiments for testing the performance

of basic floating wave absorbers and is to comprise of a water pump driven by a float. The absorber is to be able to accept a range of different float bodies, such as Cussons P6331 float range. The pump is to lift water into two reservoirs to allow the energy from the upstroke of the wave to be recorded separately from the down stroke. The unit is to be suitable for use in waves up to 100mm wave height, and in water depths greater than 220mm. The absorber is to be supplied with one float.

PACKING DIMENSIONS

Length 0.7m Width 0.4m Height 0.4m

No Power is required.

REQUIRED ACCESSORIES

A 300mm wave channel with wave generator is required such as Cussons P6275 Water Flow Channel and Cussons P6285 Regular Wave Maker, or access to suitable open water.

P6331 RANGE OF FLOATS

A number of factors affect the performance of a floating body wave absorber. The shape of the float has some effect on the efficiency of the absorber whilst the area of the float will increase the up thrust in longer wavelengths but may inhibit the stroke in shorter wavelengths.

Cussons P6331 Range of Floats includes four floats, including round bottomed floats, triangular and rectangular floats of similar floating area, and a float of similar geometry but larger size. Floats are made of medium density foam, and are each provided with pockets to which weights can be added.

P6331 Range of Floats for P6330 Wave Absorber – Technical Specification

A pack of four medium density foam floats, suitable for use with Cussons P6330. Floating Body Wave Absorber. The four floats are to provide pockets for weights to be added.