BREAKWATER (new model)

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Claim

The breakwater representsat least one hollow parallelepiped or cylindrical shape object and submerged in water fixed to the bottom in the direction of wave propagation, because of hollowness the wave flow hasforward and back motions (see Figure).

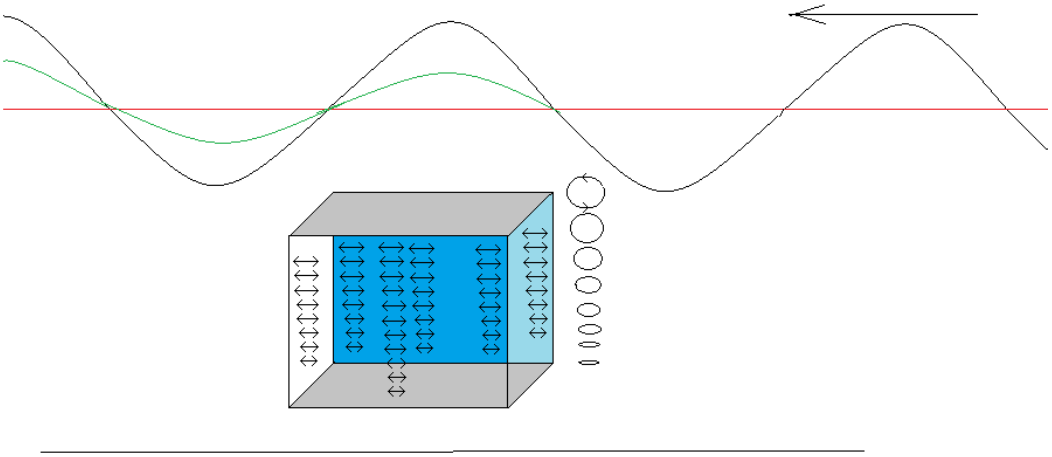

Figure.
The red line shows "mean sea level"; black - wave propagation without breakwater; green - wave propagation with the breakwater

Description

There are many kind of breakwaters which reduce the wave impact on the shore.All models are designed to reduce the kinetic energy of the wave.To do this, various forms of solid underwater structures or floating reflectors are used, havingnormal to the coastline direction.

In all cases, part of the wave energy is reflected and part is dissipated result of which the wave height decreases.

In contrast to all existing models in the presented model part of the wave passes away in the shifted phase out of the main wave.

The wave' shiftedphase depends on the ratio of the wave and the breakwater lengths.

For example, if the length of the breakwater is a half of wavelength, the secondary phase shifted wave arises in the opposite phase of the main wave, which leads to its partial dissipation, equal to that part of main wave reducing value.

The part of the wave energy required for the back-and-forth movement of water in the breakwater depends on:

1. The length of the breakwater.

2. The height of the breakwater, that the is limited with water level and the wave amplitude, since the air should not be in the breakwater .

The amplitude of the back-and-forth motion of the water in the breakwater asgreater as greater the height of the breakwater and as less as the greater the length of the breakwater.

The essence of the effect is based on the properties of waves, such as the horizontal movement of the water column due to the kinetic energy affect neighboring column of the same thickness and due to the inertia of the latter one on the surface of the water is formed a water hump.

That is the expression of the wave potential energy.

The collapse (destruction) of the wave hump causes the kinetic energy recovery.

Such a continuous process is visually perceived as moving permanent hump and this is determined by one of the index characterizing the wave - wave propagation velocity.

This effect is also based on the physical properties of water - water is hardly compressible.

Thus, when moving the column impacts on the open face breakwater (imaginary surface)water inside the breakwater cannot produce a hump and the motion received from the wave energy instantly surrenders the open end of the breakwater.

Therefore, the phase shift happens at such a time that needs to the wave to pass the length of the breakwater.

If wave period is T,

Wave velocity V,

Wave length L and Breakwater length - L_{br},

then phase shift will be happened by $T - L_{br} / V$ period.

If we calculate the latter according the wave length,

$$V(T - L_{br} / V) = V \cdot T - L_{br} = L - L_{br},$$

then the phase shift will be happened by the breakwater length.

The usage of presented model will be more sustainable, effective and profitable than the nowadays known ones.

www.youtube.com/watch?v=-H9FX1iHr3s

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