A Novel Seawall Design to Reduce Wave Reflections and Overtopping

Chen, Michael (School: Ridgeview High School)

Magnified by the effects of global warming, the coastal storms have the potential to threaten the large percentage of the world's population which resides along coastlines. Despite the promise of safety that a seawall seems to provide, examples all around the world say otherwise. One of these major disadvantages that seawalls present is the effect of wave reflections. While the wave reflections can be lessened by creating a slope on the seawall, the effect is still present and can cause scour or even worsen the waves by superimposing waves upon each other and increasing the height and probability of overtopping. However, this paper analyzes a solution to this issue through the addition of an elephant trunk inspired wave redirection "roof". This seawall addition should help to reduce the effects of wave reflections by redirecting the water upwards. The relationship between increased kinetic energy and the wave reflections will first be tested. This will be done through the construction of a curved front seawall design and testing artificial waves by pouring water down a slope. The reflected waves will be measured by a dual force sensor opposite of the seawall. The novel addition will be added once the curved front seawall is tested and the results of the two will be compared to determine if the addition helps to reduce wave reflections. Additionally, the overtopping potential of both the novel seawall design and the curved design is compared using a motor-controlled wave tank. The results of the experiment supported both my hypothesis because the relationship between wave reflection and potential energy of the wave was direct and the novel seawall design was superior in terms of the reduced force of wave reflections.

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