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Tsunami mitigation - redistribution of energy

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Tsunamis are water waves caused by the displacement of a large volume of water, in the deep ocean or a large lake, following an earthquake, landslide, underwater explosion, meteorite impacts, or other violent geological events. On the coastline, the resulting waves evolve from unnoticeable to devastating, reaching heights of tens of meters and causing destruction of property and loss of life. Over 225,000 people were killed in the 2004 Indian Ocean tsunami alone. For many decades, scientists have been studying tsunami, and progress has been widely reported in connection with the causes (1), forecasting (2), and recovery (3). However, none of the studies ratifies the approach of a direct mitigation of tsunamis, with the exception of mitigation using submarine barriers (e.g. see Ref. (4)). In an attempt to open a discussion on direct mitigation, I examine the feasibility of redistributing the total energy of a very long surface ocean (gravity) wave over a larger space through nonlinear resonant interaction with two finely tuned acoustic-gravity waves (see Refs. (5–8)). Theoretically, while the energy input in the acoustic-gravity waves required for an effective interaction is comparable to that in a tsunami (i.e. impractically large), employing the proposed mitigation technique the initial tsunami amplitude could be reduced substantially resulting in a much milder impact at the coastline. Moreover, such a technique would allow for the harnessing of the tsunami's own energy. Practically, this mitigation technique requires the design of highly accurate acoustic-gravity wave frequency transmitters or modulators, which is a rather challenging ongoing engineering problem.

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