

APPLIED MATHEMATICS COLLOQUIUM

The effect of surface waves over coral reefs, leading to a suggestion of how to defend against tsunamis

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ABSTRACT:

We will discuss drift velocities, due to wave motion of fluid which overlies a saturated porous bed. The damping effect of the porous bed leads to both a vertical and horizontal Stokes drift of the fluid, unlike the purely horizontal drift first derived by Stokes in 1847. This provides a physical model for coral reefs in shallow seas overlain by ocean wave propagation, where fluid drift both above and within the reef is vitally important for maintaining a healthy reef ecosystem. We will also explain, and show pictures of, the small vertical drift measurements in coral reefs, essential to the biological exchange between the coral layer and the sea above. Then, hopefully starting with a series of desk-top experiments (if equipment is available), we will indicate how these calculations and confirmatory field observations suggest a highly efficient, and not too costly, mechanism for diminishing the energy in tsunamis, and thus possibly saving both many thousands lives and many millions of dollars in damage, which could occur due to future unabated tsunami propagation.

THURSDAY, APRIL 20, 2023

4:15 PM – 5:15 PM

MIT – Building 4, Room 163

<https://mit/zoom.us/j/99060598635>