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A new mathematical method to relate mareograph records to quantify the wave runup

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The sea-level measurements are routinely done at various depth ranges. In Tsunami-prone regions such as Japan, measurements are taken also at intermediate depth ranges in bathymetric regions following the beach slope. It is well known from observational evidence that a depression wave (a receding shoreline) is often observed prior to the destructive Tsunami waves. However there is still no consensus as to the exact physical causes of this effect. In this study we look at the mode-triggering effects across the bathymetric parcour in one dimension. The modes, the discrete natural frequency spectrum, is due to the sudden change of the slope of the seabed. Because of the transient nature of these modes, the frequencies are on the complex plane. They are represented by discrete poles on the upper complex plane. They diverge towards the deep ocean. Because of this, the residue series does not converge uniformly. We calculate the triggering of these modes using the Fourier transform of the maerograph data. With little computational load, this can serve as a pactical tool to relate the mareograph records to the Tsunami and storm surge runup observations.