

Abstract Submitted
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Surface Gravity Wave Mechanics and Analogy with Black Hole Horizon AKANKSHA GUPTA, Indian Institute of Technology (IIT) Kanpur, Uttar Pradesh 208016, India, ANIRBAN GUHA, University of Dundee, Nethergate, Dundee DD1 4HN, UK, EYAL HEIFETZ, Tel-Aviv University, Tel Aviv 69978, Israel — Surface gravity waves in the presence of a mean current flowing over a bottom topography have analogies with the Black hole horizon. Refraction of surface waves at the white hole (time reversal of a black hole) horizon occurs when (i) the imposed mean current is counter to the direction of the surface waves and furthermore, (ii) the flow speed exceeds the wave speed. At the horizon, the incident shallow water wave splits into two distinct deep water waves: one oscillating with a positive frequency and the other with a negative frequency. Such a situation is known as the "pair-wave creation", analogous to the celebrated Hawking radiation in Black holes (S.W. Hawking, Nature 1974). Theoretical and numerical investigations on total internal reflection and tunneling have been performed using an in-house Higher-order spectral code in order to find deeper analogies between Hawking radiation and surface wave-current interactions. Conserved wave activities like pseudomomentum and pseudoenergy have been utilized to understand the pair wave creation.

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