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Sunday–Tuesday, November 24–26, 2024; Salt Lake City, Utah

Session R35: Waves: Surface Waves II
1:50 PM–3:47 PM, Monday, November 25, 2024
Room: 355 A

Chair: Kianoosh Yousefi, University of Texas at Dallas

Abstract: R35.00001 : Numerical Investigations of Capillary-Gravity Wave Scattering by a Cylindrical Barrier*
1:50 PM–2:03 PM

Abstract ➡

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The scattering of surface waves by structures intersecting a liquid surface has long been a focus in fluid dynamics due to its theoretical and practical implications. Historically, theoretical studies on this problem have predominantly employed idealized assumptions such as infinitesimally thin barriers, which do not fully represent real-world conditions. This project aims to extend the study by numerically investigating the scattering by a cylindrical barrier intersecting the liquid surface through a pinned contact line. Detailed numerical simulations of potential flow coupled with the surface elevation dynamics were conducted to analyze the interactions between the wave and the barrier. Parameters such as wave frequency and barrier radius were varied to examine their effects on the scattering. The results highlight how the barrier's dimensionless size and the Bond number influence the scattering, with notable findings on the dependency of the scattering efficiency on these parameters. The study elucidates the role of contact lines and barrier size in modifying the scattering and presents a comprehensive view of the scattering across different parameter ranges.