SCHOOL OF NATURAL SCIENCES

SEMINAR SERIES

High Spots for the Ice-Fishing Problem with Surface Tension

In the ice-fishing problem, a half-space of fluid lies below an infinite rigid plate ("the ice") with a hole. In this talk, we will discuss the ice-fishing problem including the effects of surface tension on the free surface. The dimensionless number that describes the effect of surface tension is called the Bond number. For holes that are infinite parallel strips or circular holes, the problem is transformed to an equivalent eigenvalue integro-differential equation on an interval and expanded in the appropriate basis (Legendre and radial polynomials, respectively). Computational methods are used to demonstrate that the high spot, i.e., the maximal elevation of the fundamental sloshing profile, for the IFP is in the interior of the free surface for large Bond numbers, which is consistent with previous zero surface tension results. However, we will show that for sufficiently small Bond number the high spot is on the boundary of the free surface. This talk is based on recent work completed in collaboration with Chee Han Tan, Christel Hohenegger, and Braxton Osting.

Friday, 2/25/2022	**3:00pm - 4:30pm**	**Granite Pass Room 135** **Zoom:** https://ucmerced.zoom.us/j/88105800526	For more information, contact: Professor Suzanne Sindi at ssindi@ucmerced.edu

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Nathan Willis is an applied mathematician interested in problems motivated by fluid dynamics. He focuses on models involving partial differential equations and ordinary differential equations and specializes in solving these problems with a mixture of asymptotic analysis and numerical methods. Creating high-fidelity simulations of physical systems is of primary interest to his current research as well as future career goals. Nathan will be graduating with his PhD in Mathematics from the University of Utah this Spring semester. Nathan's doctoral dissertation focuses on the linear sloshing model for ideal fluids in an unbounded domain while including surface tension effects and the steady streaming phenomenon of Newtonian and non-Newtonian fluids.