Quantized States in Centrifugal Fluid

Lo, Ta-Chao (School: Kaohsiung Municipal Kaohsiung Senior High School)

This research investigates the extraction of fluid from a rotating cylindrical container using a straw-like tube, focusing on the fluid's viscosity, rotational speed, and tube friction as key experimental parameters. The study identifies quantized states in the extraction process, revealing four bound states where the fluid remains within the tube and two scattering states where the fluid is expelled. The study also explores the macroscopic behavior of the system, including phase transitions, flow dynamics, and the impact of friction on system performance. Additionally, the research incorporates advanced fluid dynamics simulations (using the Navier-Stokes equations) and investigates the effects of whirlpool formation and optimized pump efficiency. Experimental results demonstrate that rough surfaces and high-viscosity fluids, such as sunflower oil, significantly affect pump performance. The research also applies model based on energy conversions within the system, focusing on the kinetic and potential energies involved. The findings suggest potential applications in fields such as hot fluid extraction or fluid level sensors. This study provides new insights into the behavior of rotational fluids and proposes optimized parameters for improving pump efficiency.

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