

Visualization of waves on the free surface of the compound vortex

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Abstract

I am studying a shape of free fluid surface deformed by a stationary vortex flow that is created by the disk that rotates at the bottom of transparent cylindrical container (VFT setup). To reduce an optical distortion the container of diameter 29.4 cm is placed in an open rectangular transparent Perspex tank (size 65x45x70 cm). Diameter of disk-inductor and the height of the liquid layer in the tank are chosen before each experiment. The more detailed description of the VFT setup one can find in [1]. Vortex, observed in the setup, has a compound structure: one component of which is cylindrical with a vertical axis, and the second is toroidal with circular axis. On the surface trough some kind of regular disturbances were observed [2]. During a series of experiments regular disturbances on the free surface of a compound vortex were observed and registered. The goal of the study is to visualize surface disturbances (waves) and to evaluate shape of wave crests and their spatial period (wavelength). The software used for image transformation is Adobe Photoshop CS4, MatLab 7 and Origin Pro 8. Work is in progress.

Keywords: flow, vortex, waves, free surface.

References

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- [2] E.V. Stepanova, Yu.D. Chashechkin *Anisotropic transport of an admixture in a compound vortex* Doklady Physics. Vol. 01. 53(12). 2008. pp. 634-638.