Laboratory experiments of vortices and internal waves around oscillating rectangular cylinder in a stratified viscous fluid

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Laboratory experiments of vortices and internal waves around vertically oscillating rectangular cylinder in a uniformly stratified viscous fluid of salt solution were carried out by means of visualization methods. The particle path, streak line and Moiré fringe methods were used as visualization methods. The results from the experiments are summarized as follows.
(1)The vortices were induced around the rectangular cylinder due to viscosity as the square and circular cylinders.
(2)The two vortices were generated at the corner of the rectangular cylinder, rotating in opposite directions in the vicinity to its each side wall.
(3)Associated with the flow by two vortices, the two sources of internal waves were generated at the four corners of rectangular cylinder, and so the internal waves were excited in the total of the eight sources.
(4)The observed fluid particles near the sources of the internal waves moved along elliptic path, which is different from lined path of the resonant direction of linear theory (the direction defined by the forcing frequency of vertically oscillating rectangular cylinder and the characteristic frequency of uniformly stratified viscous fluid (Brunt-Väisälä frequency)), however the velocity fields near the sources included the velocity which had the direction of resonance.
(5)As long as the rectangular cylinder was forced to oscillate vertically, the energy of oscillation was transported outward from the rectangular cylinder along the resonant direction by the movements of pushed and pulled fluid particles near the sources of the internal waves, which resulted in the development of the eight direction rays of internal waves by the two direction rays at the four corners of rectangular cylinder.

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