

## Karman vortex streets in stratified fluid -the comparison of Karman vortex streets on GMS with those by laboratory exp.-

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In winter, we can observe Karman vortex streets at the lee side of Jeju Island on GMS images when the monsoon blows hard for a long time. Some features of those Karman vortex streets differ from those in laboratory experiments and theoretical analysis. For example, the ratio ( $h/l$ ) of the interval between two Karman vortex streets ( $h$ ) to the interval between vortexes in the same line ( $l$ ) is different: the  $h/l$  is 0.28 in the inviscid analysis of Dr. Theodore Von Karman and the laboratory experiments while that of GMS images is 0.50. One of differences between atmosphere and fluid in the previous experiments and theory is whether fluid is stratified or not. We carried out laboratory experiment in order to clarify the effect of stratified fluid on features of Karman vortex streets.

In the present experiments, the test tank is a 30 x 100 x 20 cm inner dimension. We moved various shapes of objects (cylinder, cone, and frustum cone) at a constant speed in stratified or non-stratified fluid, and observed flow driven by the moving objects. The intensity of stratification is about  $1/70 \text{ g/cm}^4$  in the experiments of stratified fluid. The cylinder used in the experiment was 1cm in diameter. The cone was 5cm in diameter and 6cm high. The frustum cone was 3 and 6cm in diameter of the upper and lower base, respectively, and 3cm high. Flow visualization were made with milk paste and slit light.

When the fluid is non-stratified, Karman vortex streets formed in the case where the cylinder was moved in the fluid, while not formed in the cases of cone and frustum cone. On the other hand, when the fluid is stratified, Karman vortex streets were observed in all the cases. The  $h/l$  in the experiments are 0.20-0.40 that are smaller than that of GMS images. We carry out further experiments with various intensities of stratifications.