

Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

PIV measurements of the interaction between a surface wave and a moving sphere ANDREW RYDALCH, ERIC MAXEINER, IVAN SAVELYEV, None — The objective of this experiment was to study the interaction between the wake of a moving sphere and a surface wave moving in the same direction. The tests were conducted in an 8.5 x 2.8 m freshwater tank in 30cm of water. An underwater tow track, consisting of a belt-driven carriage riding on aluminum rails mounted on the bottom of the tank, was constructed in order to leave the free surface of the water unperturbed to allow for precise measurements at the air-water interface. In addition to the towing track, the tank also contains a single paddle wave-maker. PIV measurements were taken of the wake as the sphere moved in conjunction with the wave packet. The sphere velocity was constant and the motion was synchronized with the wave maker such that the sphere traveled inside the crest of a wave as it passed through the test area. In order to identify disturbances to the mean flow caused by the wave, the results were compared with measurements of the wake of the same sphere moving through quiescent water, and also of the wave field without the sphere present. In both comparisons, the measurements can be subtracted from the wave/sphere case to characterize the interaction. The results are applicable to motion control systems for vehicles operating in the presence of surface waves.

Andrew Rydalch
None

Date submitted: 27 Jul 2012

Electronic form version 1.4