

Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

A study of wakes trailing a cavitating and ventilated NACA 0015 hydrofoil¹ RUNE W. TIME, University of Stavanger, MORTEN KJELDSEN, Flow Design Bureau AS, ROGER E. ARNDT, University of Minnesota, UNIVERSITY OF STAVANGER TEAM², UNIVERSITY OF MINNESOTA TEAM — In certain types of pumping applications oscillations are induced by operation with liquids containing immiscible gas in solution. To understand the physics of this process, a series of tests with a ventilated 2D NACA 0015 hydrofoil were performed in the water tunnel at the St. Anthony Falls Laboratory of the University of Minnesota. A relation between the cavitation index for both ventilated and naturally cavitating flows has been established. This allows direct comparison between the two types of two-phase flows. A good correspondence is found when comparing drag, lift breakdown and lift/drag oscillation amplitudes for a properly defined cavitation index. A careful analysis is required to compare the spectral content of oscillatory flow. This study concentrates on analyzing wake structure for selected ventilation rates and cavitation numbers. The wake structure is mapped by conventional PIV techniques. Results for high cavitation/ventilation number flows are presented. Since conventional PIV represents snap shots of a time evolving phenomenon special care needs to be taken for the analysis.

¹Support from the Norwegian Research Council is greatly appreciated.

²Cooperation with Flow Design Bureau AS.

Rune W. Time
University of Stavanger

Date submitted: 07 Aug 2007

Electronic form version 1.4