Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Velocimetry in both phases of a cavitating flow by fast X-ray imaging[1] OLIVIER COUTIER-DELGOSHA, ILYASS KHLIFA, LML / Arts et Metiers ParisTech, MARKO HOCEVAR, Laboratory for water and turbine machines, Faculty of Mechanical Engineering, Univ. of Ljubljana, SYLVIE FUZIER, LML / Arts et Metiers ParisTech, ALEXANDRE VABRE, CEA LIST, KAMEL FEZZAA, X-ray Science Division, Argonne National Laboratory — A promising method to measure velocity fields in a cavitating flow is presented. Dynamics of the liquid phase and of the bubbles are both investigated. The measurements are based on ultra fast X-ray imaging performed at the APS (Advanced Photon Source) of the Argonne National Laboratory. The experimental device consists of a millimetric Venturi test section associated with a transportable hydraulic loop. Various configurations of velocity, pressure, and temperature have been investigated. Radio-opaque particles are used as tracers for the liquid phase, in association with a multi-pixels sensor to record the successive positions of the particles. The use of X-rays instead of light solves the problem of light reflection and dispersion on phase boundaries, since X-rays penetrate a gas/liquid flow in straight lines. Images contain simultaneously the information related to the particles (for PIV analysis in the liquid), to the vapor bubbles (for PIV in the gas). The slip velocity between vapor and liquid is calculated everywhere both velocities can be obtained.

[1]Use of the Advanced Photon Source at Argonne National Laboratory was supported by the U. S. Department of Energy, Office of Science, and Office of Basic Energy Sciences.

Olivier Coutier-Delgosha
LML / Arts et Metiers ParisTech

Date submitted: 06 Aug 2012 Electronic form version 1.4