Title: 800 fps neutron radiography of air-water two-phase flow

Authors: Robert Zboray, Pavel Trtik

PII: S2215-0161(18)30018-9
DOI: https://doi.org/10.1016/j.mex.2018.01.008
Reference: MEX 254

To appear in:

Received date: 17-5-2017
Accepted date: 21-1-2018

Please cite this article as: Zboray, Robert, Trtik, Pavel, 800 fps neutron radiography of air-water two-phase flow.MethodsX https://doi.org/10.1016/j.mex.2018.01.008

800 fps neutron radiography of air-water two-phase flow

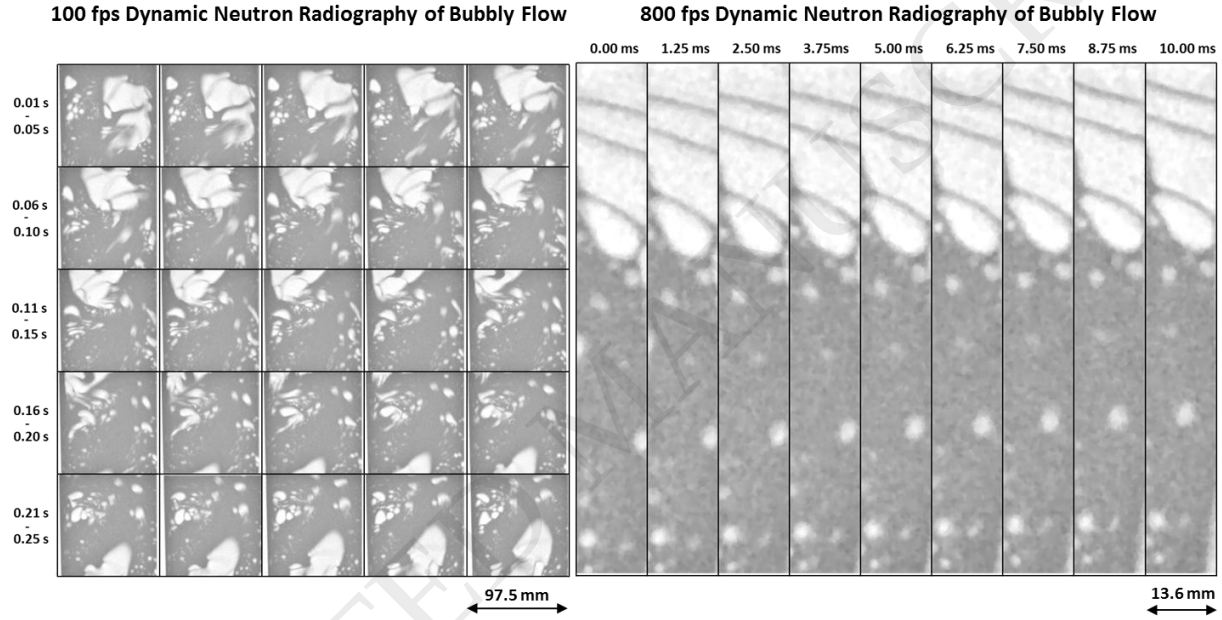
Robert Zboray[1], Pavel Trtik[2,*]

[1]*Laboratory of Thermal Hydraulics, Division of Nuclear Energy and Safety, Paul Scherrer Institut, 5232 Villigen PSI, Switzerland*

[2]*Neutron Imaging and Activation Group, Laboratory for Neutron Scattering and Imaging, Paul Scherrer Institut, 5232 Villigen PSI, Switzerland*

[*]*Corresponding author. Tel.: +41-56-310-5579; fax: +41-56-310-3131*
E-mail address: pavel.trtik@psi.ch; ptrtik@gmail.com

Graphical abstract



The highlights of this publication are:

- Demonstration of up to 800 frames per second dynamic cold neutron radiography
- Application of such technique for non-periodic (transient) process of bubbly flow in water.
- Potential for quantification of (i) instantaneous gas volume fraction in dynamic two-phase flow and (ii) instantaneous gas phase velocimetry

Abstract

We have demonstrated dynamic cold neutron imaging of air-water two-phase flows up to 800 frames per second imaging rates. This has been achieved by using a high-efficiency (relatively thick) scintillator screen in combination with the highest available flux on a continuous spallation source and a high-speed sCMOS camera. This combination renders the spatial resolution to relatively modest value of about 0.5 mm, which is nevertheless sufficient for resolution of bubbles of the size