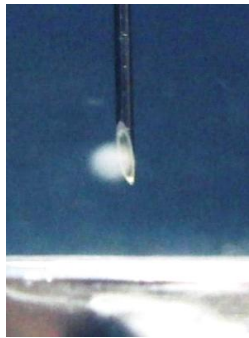
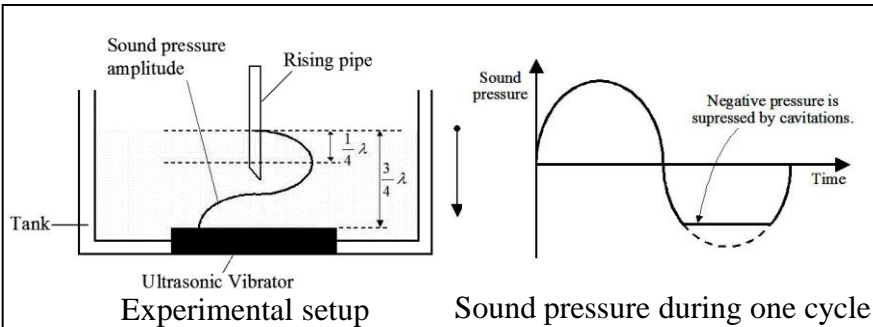
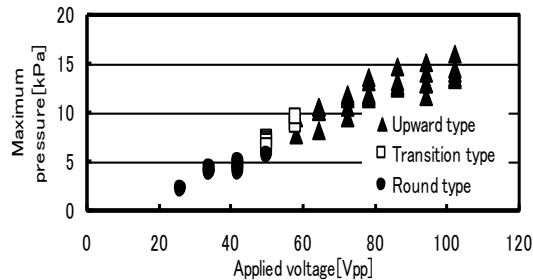


# Development of Ultrasonic Pump using Pressure Differences of Cavitations

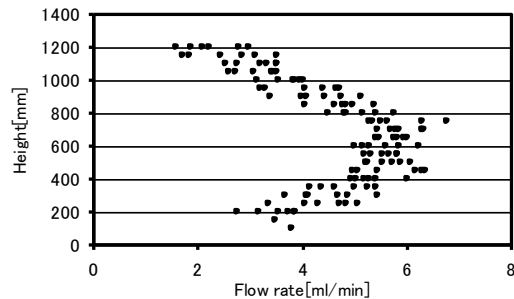
Associate Professor Tameo Nakanishi



Cavitation-cloud



Applied voltage versus maximum pressure



Flow rate versus water head

## Content :

In recent years, micro-pump technology has attracted substantial attention as a key element of micro-fluidics. Various types of micro-pumps have been developed and employed in mechanical, chemical, biological and medical engineering. Common requirements to these micro-pumps may be described as capability of pumping any types of liquid, enabling micro-sizing, high-precision, and good durability.

We developed a novel pumping method using ultrasound induced pressure differences and cavitations. An ultrasonic vibrating surface is fabricated at the bottom of a water tank. Standing waves are formed between the vibrating surface and the water surface. A vertical pipe of a small inner diameter of typically 0.3mm is inserted in the water in a typical depth of  $\frac{1}{4}$  to  $\frac{1}{2}$  wavelength. Increasing the power of the ultrasound, steady cavitation cloud starts forming around the pipe inlet, which suppresses negative pressure in the vibrating cycle and results in a continuous pumping of water. A pumping pressure of over 20kPa and flow rate of 6ml/min can easily be achieved by the proposed pumping method. Patent application has been made for the present invention.

Yamagata University Graduate School of Science and Engineering  
Research Interest : Fluid Engineering

E-mail : [tameo@yz.yamagata-u.ac.jp](mailto:tameo@yz.yamagata-u.ac.jp)

Tel : +81-238-26-3231

Fax : +81-238-26-3231

HP : <http://mipultra.yz.yamagata-u.ac.jp/>

