Ultrasonic Velocity Profiler for Geoscience

Yasushi Takeda[1]

[1] Mechanical Engineering, Hokkaido Univ.

http://ring-me.eng.hokudai.ac.jp

Ultrasonic Velocity Profiler (UVP) has been established as a new tool in Experimental Fluid Mechanics, which enables one to obtain spatio-temporal velocity field of any liquids. Thanks to its propagation characteristics in opaque liquids, measurement of flow field of liquid metal flows and other rheological flows has become possible.

A principle of UVP is a pulsed Doppler echography whereby analyzing the echo signal to detect a time-of-flight of the pulse to determine the position and to evaluate an instantaneous Doppler shift frequency to determine the velocity at that position. Quite a lot of flow configurations have been measured to confirm the principle and practice of the system.

Besides the physics study of fluid flow, knowing flow field in liquid metal flows is essential in geoscience and various flow configurations have been challenged in various liquid metals such as mercury, lead-bismuth, gallium and others. These examples will be given to show how it is effective to use this new method in geoscientific study. A recent challenge for measurement of rheological flow will also be introduced.