

GE Hitachi
Nuclear Energy

UdFlow System

**Commercialization
Requirements and Expectations**

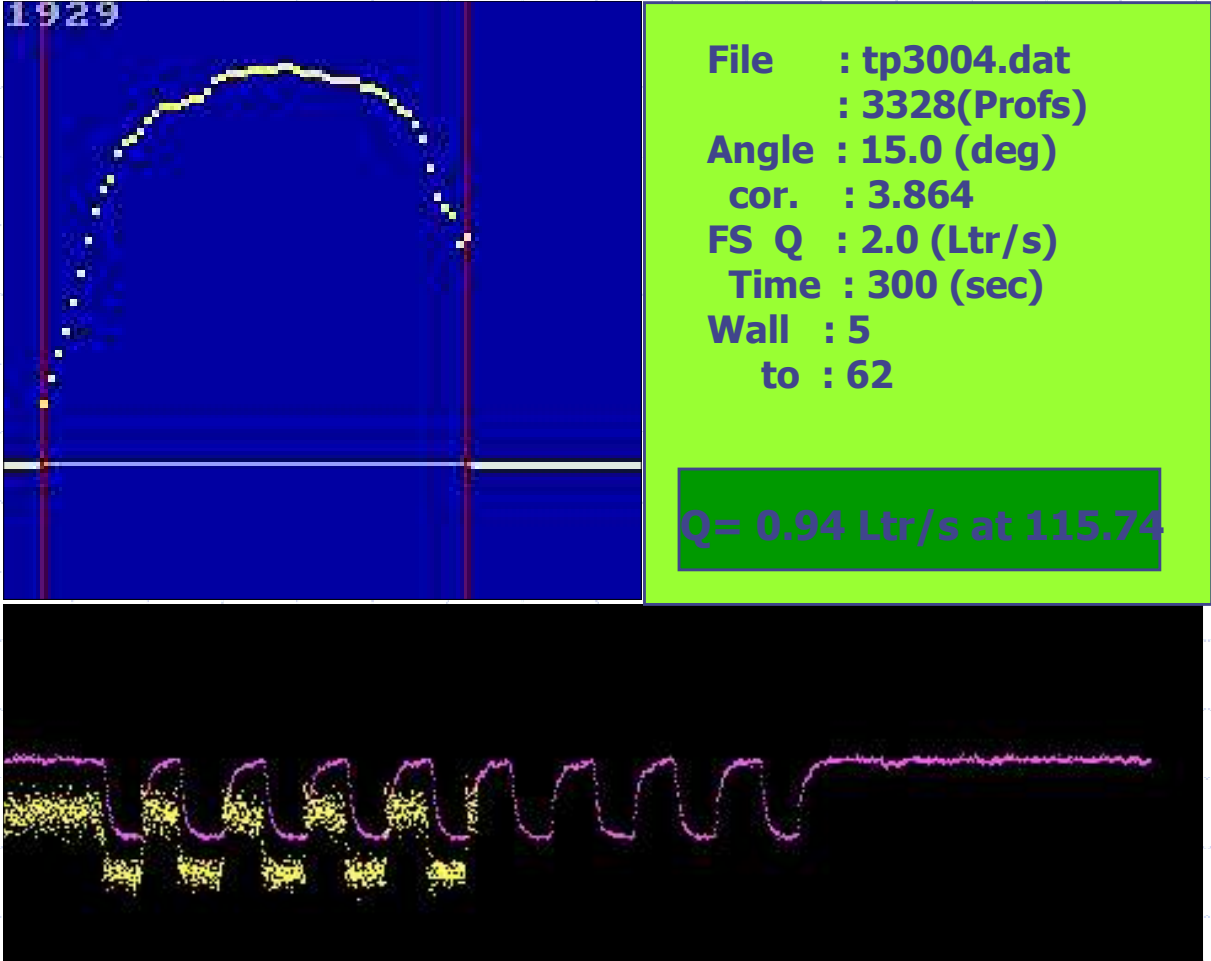
April 6, 2009

eNPP # 05-184.1

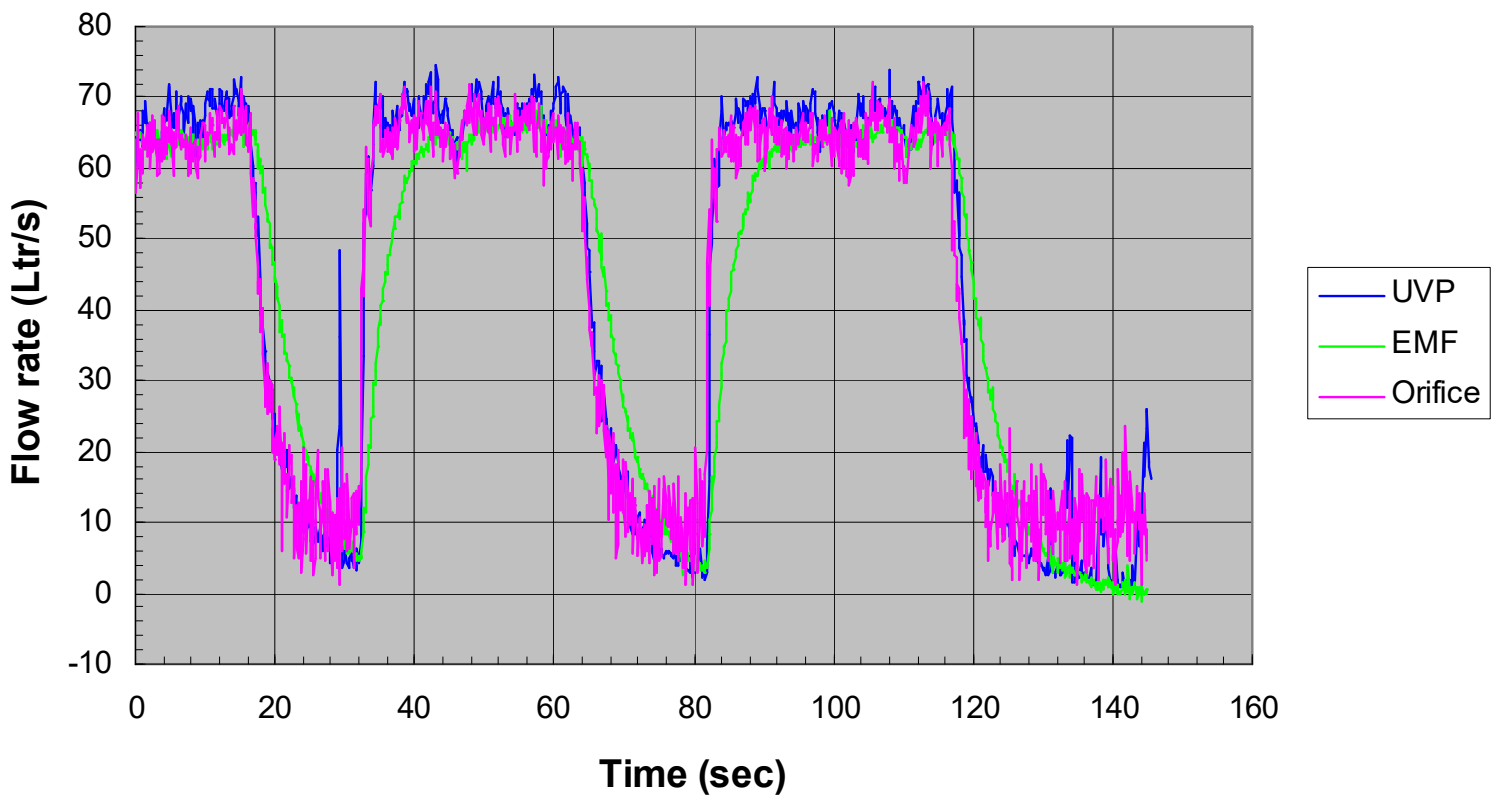


Small pipe

Profile and flow rate



Transient flow rate (comparison)



uGFlow Ultrasonic

Innovative, high accuracy flow measurement

流量計・エネルギー・キャリア

High accuracy,
Non-Invasive technique,
Clamp-on installation,

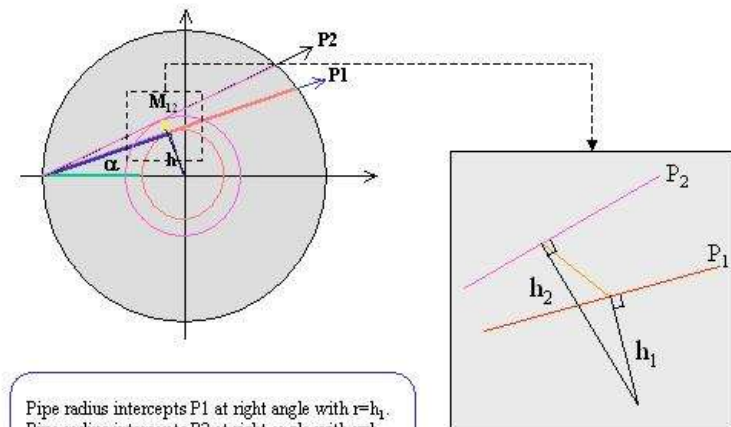
"First principles" method ... No required calibration
No need for fully developed pipe flow

Measurement of the velocity distribution in a pipe is a key issue for making accurate flowrate measurements. This issue is currently being realized for water flow measurement using the ultrasonic Doppler technique. However, for gas flow, no method has yet met the challenge of measuring the velocity profile in a pipe for the purpose of flowrate measurement.

We have developed a novel method to obtain the velocity distribution for a gas flow in a pipe. Our method uses ultrasonic pulse flight information on different paths in a pipe. Based on our experience gained through water flow metering, our method is expected to *not only improve the accuracy by one order of magnitude, but also to relax various conditions for the installation of the meter.*

Working principle - measurement of velocity distribution

Propagation characteristics depend on the velocity distribution in a pipe. Axisymmetric flow is assumed and velocity distribution is a function of radial position only.



Pipe radius intercepts P1 at right angle with $r=h_1$.
Pipe radius intercepts P2 at right angle with $r=h_2$.
If opening angle $\alpha_1 \approx \alpha_2$, velocity at h_1 might be approximated as velocity at h_2 to be u_1 .

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Development partner is being sought.



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