Novel Design of a Large Scale Vortex Schedding Flow Meter

Ernst von Lavante[2], Henrik Krisch[1], Thibaud Foletti[3,2]

[1] KROHNE Messtechnik GmbH, Department Development Sensors, Ludwig-Krohne-Str. 5, 47058 Duisburg, Germany
[2]Faculty of Engineering Sciences, University of Duisburg-Essen, Duisburg, Germany
ICAM, Lille, France

ernst3.vonlavante@uni-due.de phone +49 203 379 3029; www.uni-due.de

This publication presents a novel solution to the known problem of designing a vortex flow meter for large scale applications, typically for DN-sizes over 300. Here, in particularly in case of the fluid metered entering at low velocity close to minimum volumetric flow, the frequency of the vortex shedding is very low, the amplitude of the pressure changes small and the corresponding bluff body very large and therefore heavy and costly. As a consequence, the detection of the vortex shedding frequency is difficult and the signal typically noisy.

The present method borrows its concept from the turbine flow meter, where a central body is acting as flow conditioner and flow straightner. The flow is first being decelarated to zero velocity at the stagnation point, then redistributed and reconditioned along the central body. Possible rotational component of the flow is being removed by a system of vanes. The flow accelerates to a final velocity given in incompressible case by the ration of the areas before and after the central body.

The present investigators therefore decided to place a bluff body into a channel formed by a central body, see Figure 1. Thus, the bluff body is much smaller, and is experiencing much larger velocity, resulting in much higher frequencies with larger amplitudes.

The full paper will concentrate on the optimization of the bluff body as well as the central body. The two components have to be optimized in order to obtain good linearity of the resulting signal.

Keywords: flow metering, vortex flow meters, numerical flow simulation, flow straightners, detection of vortex shedding frequencies.