

Water Hammer and Cavitational Hammer in Process Plant Pipe Systems

Abstract

Fast acting valves are often applied for quick safety shut-down of pipelines for liquids and gases in the chemical and petrochemical industry as well as in power plants and state water supplies. The fast deceleration of the liquid leads to water hammer upstream the valve and to cavitational hammer downstream the fast closing valve.

The valve characteristics given by manufacturers are usually measured at steady state flow conditions of the liquid. In comparison, the dynamic characteristics depend on the initial liquid velocity, valve closing velocity, the absolute pipe pressure and the pipe geometry. Fraunhofer UMSICHT conducts various test series examining valve dynamic characteristics in order of the dynamic analysis of pressure surges in fast closing processes. Therefore a test rig is used which consists of two pipelines of DN 50 and DN 100 with an approximate length of 230 m each.

In this paper the results of performed pressure surge experiments with fast closing and opening valves will be compared to calculations of commercial software programs such as MONA, FLOWMASTER2. Thus the calculation software for water supply, power plants, oil and gas and chemical industry can be permanently improved.

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