

Modelling of hydraulic vibrations in network systems

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SUMMARY

This paper presents a theoretical basis for forced vibration modelling in a pressurized hydraulic network. The main assumptions are based on the procedure described by Streeter. The hydraulic system is supposed to be excited by one or several vibration sources with the known angular velocity of periodic oscillations so that a stationary harmonic state has been established. The basic hydrodynamic equations are linearized in that interval of changes, so that the oscillatory part is expressed in the complex domain of numbers. This results in a possibility of an analytical solution for the ordinary (simple) pipe. In this paper the procedure has been generalized and a procedure for connecting various element types into a network has been presented. The paper also presents various nodal conditions, which have to be established in order to make it possible to solve the system of complex algebraic equations. The applied procedure of assembling a system of equations is similar to the procedure which is applied in standard modelling of non-stationary flow in a network hydraulic system. Finally some illustrative examples are presented.
