

Numerical Analysis of Water Hammer in a Viscoelastic Pipe System Considering Fluid Structure Interaction

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Abstract : This study investigates the effects of pipe-wall viscoelasticity on water hammer pressures. Tests have been conducted in a reservoir-pipe-valve system configured of a main viscoelastic pipeline and two short steel pipes placed upstream and downstream of the main pipe. Rapid closure of a manually operated valve at the downstream end generates water hammer. Experimental measurements at several positions along the pipeline have been collected from the papers. Computer simulations of the experiment have been performed and the results of runs with various options affecting the water hammer are provided and discussed. It is shown that the incorporation of viscoelastic pipe wall mechanical behavior in the hydraulic transient model contributes to a favorable fitting between numerical results and observed data.

Keywords : pipe system, PVC pipe, viscoelasticity, water hammer

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