

# **Soil effect on gates valves operation laws in a perfect water hammer**

Bibliography shows that the water hammer, extreme phase of transient flow, happens in two forms: increasing and decreasing which are harmful to the good resistance of pipes. This phase arises when maneuvers that can be accidental or quite normal, such as stopping a pump, closing or opening a valve interfere with the conditions of steady flow. This leads to large pressure and velocity variations which can cause implosions or bursting of free and buried pipes.

To minimize the negative consequences, our study aims to use the Bergeron's graphical method of characteristic quantities in order to optimally model the water hammer and deduct accordingly an operation law meeting this optimization. Our reasoning will be developed considering the case of free and buried pipes where an application for comparative purposes will be made for three pipe materials: steel, PVC and HD-polyethylene.