

Investigation and Analysis of Vortex-Induced Vibrations in Sliding Gate Valves Using Computational Fluid Dynamics

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Abstract : In this study, the event of vibrations caused by vortices and the distribution of induced hydrodynamic forces due to vortices on the sliding gate valves has been investigated. For this reason, a sliding valve with the help of computational fluid dynamics (CFD) software was simulated in two-dimensional)2D(, where the flow and turbulence equations were solved for three different valve openings (full, half, and 16.7 %) models. The variety of vortices formed within the vicinity of the valve structure was investigated based on time where the trend of fluctuations and their occurrence regions have been detected. From the gathered solution dataset of the numerical simulations, the pressure coefficient (CP), the lift force coefficient (CL), the drag force coefficient (CD), and the momentum coefficient due to hydrodynamic forces (CM) were examined, and relevant figures were generated were from these results, the vortex-induced vibrations were analyzed.

Keywords : induced vibrations, computational fluid dynamics, sliding gate valves, vortices

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