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Author: Keyword:

Search

[ADVANCED](#)
[TOP](#) > [Available Issues](#) > [Table of Contents](#) > [Abstract](#)

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EXPERIMENTAL AND NUMERICAL STUDIES ON STEEL PENSTOCK VIBRATIONS CAUSED BY PRESSURE PULSATIONS

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In our previous paper, we described vibrations with circumferential mode number $n = 2$ when a frequency of a pressure pulsation in a turbine coincides with the natural frequency of a steel penstock. We proposed the use of natural frequency calculation formulae based on numerical analyses that target $n = 2, 3$ vibrations. Because a limited number of papers are available describing experimental or analytical vibration studies, we performed 1/4 scale model experiments on pressure pulsations with the parameters of plate thickness and the presence of stiffeners. Based on a comparative study of experiments and numerical analyses, we proposed modification of the vibration prevention specifications stipulated in the current technical standard.

Key Words: steel penstock, pressure pulsation, vibration test, numerical analysis, design standard

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