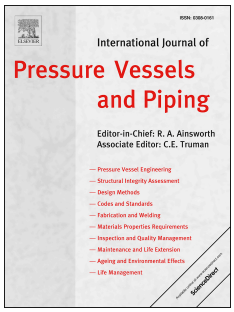
Accepted Manuscript



Vibration analysis of a complex fluid-conveying piping system with general boundary conditions using the receptance method

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PII: S0308-0161(18)30085-1

DOI: 10.1016/j.ijpvp.2018.07.005

Reference: IPVP 3733

To appear in: *International Journal of Pressure Vessels and Piping*

Received Date: 7 March 2018

Revised Date: 2 July 2018

Accepted Date: 8 July 2018

Please cite this article as: Zhang T, Ouyang H, Zhao C, Ding YJ, Vibration analysis of a complex fluid-conveying piping system with general boundary conditions using the receptance method, *International Journal of Pressure Vessels and Piping* (2018), doi: 10.1016/j.ijpvp.2018.07.005.

Vibration analysis of a complex fluid-conveying piping system with general boundary conditions using the receptance method

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Abstract

In this paper, a new set of six-variable linear partial differential equations of motion of fluid-conveying pipes with general boundary conditions are derived using the Hamilton principle and these equations are solved by the receptance method. The frequencies of the straight pipes conveying fluid with or without elastic supports are determined and the results are compared with experimental ones. Then a fluid-conveying, semi-circular pipe and complex piping system with different kinds of boundary conditions are studied. These pipes are divided into some straight pipe units and are assembled using the receptance method. The numerical results show that the receptance method is efficient for pipes with arbitrary geometrical layouts and support types, and once the dynamic receptance of the elastic support of a piping system is obtained via experiment, its dynamic stability at different fluid velocities can be analysed by the receptance method.

Keywords: complex fluid-conveying piping, general boundary, receptance method

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