

Structural identification of a fire-protection piping system

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Abstract. Recent earthquakes worldwide have proven that losses not only result from damage to building structures but also non-structural components, which, in many cases, inhibit the use of low, damaged structures. In fact, especially for strategic structures such as hospitals, the leakage of fire protection systems could jeopardize the functionality of the facilities, resulting in the absence of medical functions and fire protection, or a fault in the system itself could cause injuries. In this work, the results of an experimental ambient vibration test are reported to determine the dynamic properties of a piping system, such as the natural frequencies and mode shapes, to establish the constraints/restraints that are uncertain in the case of existing constructions, and upload a numerical model implemented with SAP2000. Most of the numerical natural frequencies achieve a good correlation with the measured frequencies, allowing a calibration of the effective constraints/restraints.

Keywords: Piping system, Dynamic properties, Modal analysis, Ambient vibration test.

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