

Dynamic response under pedestrian loading of the footbridge “La Belle Liégeoise”

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Abstract

The particularly slender type of the footbridge "La Belle Liégeoise" is very sensitive to the pedestrian actions. A few days after the opening of the bridge, at the end of a huge spectacle organized in the Boverie park, some thousands of people took, in one way, the footbridge to reach the city. At this time, a lateral pitching of the suspended part of the structure started, making the crossing uncomfortable for users although this vibration frequency is outside the critical window defined by the SETRA guide.

The purpose of this paper is to detail the sizing of the seven tuned mass dampers equipping the structure to meet the code's requirements and to explain studies carried out by Greisch to analyse causes of these large vibrations and propose solutions to solve the problem, or even to anticipate it for future works.

Keywords: Footbridge, Slender, Welded, Dynamic, Tuned mass dampers, Lateral vibrations

1 Introduction

The new footbridge known as “La Belle Liégeoise” was opened on 2nd May 2016. It provides a path for cyclists and pedestrians between Guillemins railway station (Liege – Belgium) and La Boverie park across the Meuse, maintaining an 8 meters clearance for navigation.

The 294 meters long superstructure of the bridge is made of steel. The supporting structure for the main span over the Meuse (163 m * 7 m) is a suspended construction, positioned on the side of the deck, thus completely freeing up the view towards the Guillemins esplanade.



Fig. 1. Deck structure

This particularly slender type of structure is sensitive with respect to its vibratory dynamic behaviour. Tuned mass dampers were designed to meet the required conditions of comfort.