



Development and Design of Noise Barriers for High Speed Railways

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Summary

Sound walls at high speed railway tracks are subject to significant aerodynamic actions induced by passing trains. Severe damages to noise absorbing panels observed at a recently opened high speed railway line revealed deficiencies in the common design concepts and methods. The deficiencies apply to the load models as well as to the structural design.

In order to prevent damages to future structures a modified model of aerodynamic train actions on adjacent structures has been developed on the basis of new measurements.

This contribution explains the background information on the dynamic response of sound walls and shows the first application of the new action model to the design of a new high speed train line. In lieu of existing experience and knowledge parameter studies have been performed in order to cover possible uncertainties in the assumptions and to provide design data for various alternative solutions.

In order to provide sound wall systems with sufficient resistance to the dynamic and fatigue actions new noise absorbing panels have been developed considering the conclusions from damages observed before. These new elements were subject to numerical and experimental investigations of ultimate and fatigue resistance. For proving the dynamic behaviour of the new panels prototypes were also tested under real conditions at the high speed line. Measurements of the aerodynamic actions and of the dynamic response of the sound wall provided data on action effects allowing determination of realistic values for the ultimate limit state and fatigue verifications.

Keywords: high speed railways, noise protection, sound wall, dynamic response, dynamic actions, fatigue

1. Introduction

Prevention and reduction of traffic noise is an indispensable contribution to the improvement of life quality and environment protection. For high speed railways noise reduction belongs to the essential tasks in the conceptual, design and execution phases. Noise protection at railroads is usually realised in terms of noise barriers, which may vary in types and materials used.

Restrictions with regard to land area consumption often forced decisions in favour of *sound walls* which can be placed very close to the tracks (Fig. 1) and limit additional weight on bridges (Fig. 2). The commonly used type of sound walls consists of vertical posts supported by pile foundations or by the bridge structure and of horizontal noise absorbing panels. Noise absorbing panels made of thin walled aluminium sheets were preferred due to their low weight allowing reduction of erection costs and enabling fast access to the track in case of emergency.