

Bridge frame soil



Overview

Frame bridges are coupled to the surrounding soil through their foundations, resulting in intense SSI. Excitation of the bridge superstructure causes displacements at the abutments, generally resulting in a phase-shifted ground reaction and radiation damping. The quotient of ground reaction and displacement is both material and frequency dependent. Explicit dynamic calculations are required in various standards for bridges on high-speed lines to ensure normative limits. This dynamic analysis is based on the resonance phenomena between the train crossing and the frame's natural frequencies in bending. It is obvious that, especially here, an exact determination of the natural frequencies in the numerical models is important for determining the resonance speed, as there is no conservative consideration in dynamics. Furthermore, considering radiation damping based on soil-dynamic approaches can noticeably reduce the maximum amplitudes at the resonance point when simulating train crossings. However, due to the massive

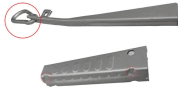
dimensions of structural members and a large number of constraints, the dynamic system of railroad frame bridge.

- Investigation of the dynamic behaviour of embedded frame bridges.
- Identification of the key factors influencing the dynamic behaviour of railway frame bridges.
- Different modelling methods for SSI are compared.
- A dynamic design recommendation is presented.

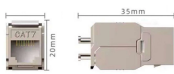
Frame bridge
Dynamic soil-structure interaction
Coupled BEM-FEM
Direct method
Substructure method
Hybrid method
Simplified method

Dynamic characteristics
Railroad bridges are subject to dynamic loads. According to observations on the railway line between Paris and Lyon, destabilisation of the ballast can occur on a dynamically excited short bridge due to significant vertical accelerations. Therefore, the resulting system behaviour is subject to normative limits (in Europe: ; Germany:), as the maximum superstructure acceleration must be limited to ensure a stable ballast bed. Fundamental to the dynamic calculation is a precise determination of the modal characteristic, otherwise, discrepancies in the system response (resonant speed of the passing train, maximum accelerations) may occur. Studies regarding the resonance mechanism of railroad bridges due to train induced excitation can be found in Refs. [,,,], among others. A.

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Integral bridges are structures without bearings and mechanical expansion joints, whereas the connection between the superstructure and the substructure is usually framed. Therefore, these ...



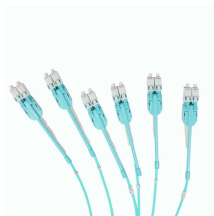
Therefore, this paper presents a detailed numerical investigation on the cyclic interaction behavior of integral railway bridges.



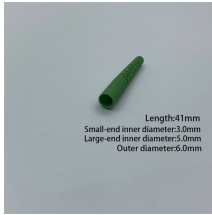
This manual focuses solely on soil nail systems for long-term support of excavations and does not specifically address the use of soil nails as temporary structures. This GEC serves as the FHWA ...



DYNAMIC SOIL-STRUCTURE INTERACTION OF PORTAL FRAME BRIDGE WALLS FOR HIGH-SPEED RAILWAYS. Master's Dissertation. Structural Mechanics. Report TVSM-5219 HENRIK ...



Most civil structures, especially bridges (piles, pile caps, abutments and retaining structures) are built on or inside the ground (Fig. 1). When analyzing such a structure, there is a great difference in the result ...



This paper examines the dynamic behaviour of embedded frame bridges, including the effect of soil-structure interaction, under 2D and 3D numerical approaches.



They transfer structural loads to deeper, more competent soil layers or bedrock. This guide provides a detailed overview of bridge pile foundation ...



These issues complicate the geotechnical aspects of integral bridges. The aim of this paper is to present a comprehensive review of current geotechnical design practices and the ...



For seismic loading, a soil-spring model (Figure 4.2-12b) should be considered to capture the soil-structure interaction. Programs such as CSiBridge or ADINA can be used.



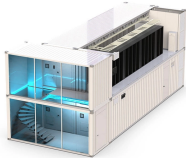
This paper presents an efficient approach for the modal analysis of coupled soil-structure systems, for which the dynamic response is strongly ...



This paper considers the approaches most suitable for modelling common integral bridge forms, expanding upon recent UK guidance regarding soil-structure interaction approaches.



This paper presents an efficient approach for the modal analysis of coupled soil-structure systems, for which the dynamic response is strongly influenced by the embedment in the soil.



This manual provides information on the design and construction of Geosynthetic Reinforced Soil (GRS) abutments and the Geosynthetic Reinforced Soil-Integrated Bridge System (GRS-IBS). It serves as a ...



These issues complicate the geotechnical aspects of integral bridges. The aim of this paper is to present a comprehensive review of current ...



For each bridge site the Soils Design Unit in the Design Bureau provides to the Bridges and Structures Bureau a bridge soils package that typically includes three primary items: the boring logs, the soil ...

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