

Load on long-span bridge structures



AI Overview

Long-span bridges are subjected to a combination of dead, live, environmental, and dynamic loads, with vehicle-induced fatigue being a primary concern for structural safety and longevity.

Types of Loads

Dead Loads: These are permanent loads due to the weight of the bridge itself, including the deck, cables, pylons, and other structural components. Dead loads are constant and form the baseline for structural design and analysis . **Live Loads:** Live loads primarily include vehicles, pedestrians, and temporary construction loads. For long-span bridges, vehicle loads are critical, as repeated traffic can induce fatigue in cables, hangers, and deck elements. Standards such as BS 5400 recommend considering one fatigue vehicle per lane at a time, with separate calculations for adjacent lanes . **Environmental Loads:** Long-span bridges are exposed to wind, snow, temperature variations, and seismic activity. Wind loads can induce vibrations and oscillations, while temperature changes cause expansion and contraction of structural elements . **Dynamic Loads:** These include the effects of moving vehicles, braking forces, and impact loads. Dynamic load testing, such as pulse tests and vehicle-induced vibration tests, is used to evaluate the bridge's response, including strain, deflection, and damping characteristics .

Load Analysis and Testing

Static Load Testing: Measures strain, deflection, and potential cracking under controlled loads. It ensures that the bridge can safely carry expected traffic without...

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Wind and vehicle loads are the primary factors influencing the dynamic response of long-span bridges and ride

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Exploring the dynamic response of floating bridges under traffic flow loads is crucial for ensuring the normal

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The Science Behind Long-Span Bridges and Their Structural

This article explores the science behind long-span bridges, including design principles, structural integrity

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Development of Live-Load Models for Long-Span Bridges Based on

Multiple years of data from twelve WIM sites are utilized to develop the load spectra. A total of seven types of load

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Dynamic load allowance of long-span modular steel bridges

However, they generally face operational restrictions for span lengths greater than 60 m. Recent technological

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Live Load Model for Long Span Steel Cable Bridges ...

Current design live load model for bridges are mainly for short to medium span bridges. For these bridges, one very

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Steel Bridge Design Handbook Vol.7

This course was adapted from the U.S Department of transportation Federal Highway Administration, Publication No, FHWA-HIF-16-

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Study on dynamic responses and impact factors of long span ...

This study focuses on the Wujiang Bridge, the largest long span deck type CFST arch bridge globally, examining its

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Influence of the sag-to-span ratio on the dynamic response of a long ...

ABSTRACT Long-span bridges suspended from floating towers are a promising design concept to cross the strait

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MODELING WIND LOADS ON LONG-SPAN BRIDGES

ABSTRACT: In this paper, a critical review on modeling of wind loads on long-span bridges is traced. Starting from the theoretical

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12 Types of Loads Considered for Design of Bridge Structures

But for medium span bridges, wind load should be considered for substructure design. For long span bridges, wind load is

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The long span deck type concrete filled steel tube (CFST) arch bridge encounters considerable safety risks under

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The numerical study is carried out on a long-span cable-stayed bridge to investigate the effects of correlation in GVWs

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Slender long-span bridges exhibit unique features which are not present in short and medium-span bridges such as

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This article proposes a traffic load model for long-span suspension bridges in the framework of Eurocode Load Model

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Loading on Long Span Bridges in Heavily Trafficked Areas

A probabilistic methodology is developed for the evaluation of characteristic maximum traffic load on long-span

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Establishment and effect analysis of traffic load for long-span bridge ...

Combined with Greenshields theory, the generated samples were used to form traffic flows with different intensities in

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(PDF) The development of live load for long span bridges

The available live load models were developed for short and medium span bridges. The paper deals with the

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Design Considerations for Long-Span Bridges: Challenges and Solutions

Learn about the challenges faced in the design of long-span bridges and the solutions employed to overcome them.

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Extreme response to traffic of long-span cable-stayed bridges ...

However, most traffic load models in existing codes are predominantly developed for small and medium-span bridges.

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Fatigue Reliability Assessment for Long-Span Bridges under

During a bridge's life cycle, the stresses from multiple dynamic loads might be superposed and progressive fatigue

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Dynamic Interaction Analysis of Long-Span Bridges Under ...

These analyses comprehensively evaluate the dynamic response of the bridge under various traffic densities and wind

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Long-span bridges

In the 20th century, with the construction of bridges with spans exceeding 1000 m, and up to nearly 2000 m in this century, large

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Probabilistic model of traffic scenarios for extreme load effects in ...

In this paper, a probabilistic Gaussian mixture model (GMM) for heavy vehicle scenarios on the bridge deck under free

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(PDF) Vehicle Load Effect of Long-Span Bridges

However, load distribution and composition are complicated on long-span bridges and vary significantly. In general,

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Experimental study of aerodynamic stability of a long-span bridge

The study of interaction between a long-span bridge and wind flow is a challenging task. A lot of cases are known all

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Vehicle load loading method for the fatigue analysis of

This paper summarizes the vehicle load application method for fatigue analysis of medium-

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Load Testing and Analysis of a Large Span Through Simply ...

To evaluate the true load-bearing capacity and engineering reliability of a large span through a simply supported steel

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Dynamic response analysis of a long-span bridge with thin-walled high ...

In mountainous regions, bridges are commonly designed as long-span structures that span across valleys. These

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Long term monitoring of service performance for large-span

Abstract To effectively evaluate the serviceability and stiffness distribution of large-span continuous rigid frame bridges

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Wind Effects on Long-Span Bridges: A Practical Structural Explanation ...

Engineers who design bridges beyond 150 m spans must treat wind as a primary design load, not a secondary

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Challenges and Solutions in Structural Design for Large

Large-span structures—such as stadiums, bridges, auditoriums, and airports—pose unique

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Fatigue analysis of long-span suspension bridges under multiple loading ...

Fatigue assessment shall be performed to ensure the safety and functionality of the bridges. This paper proposes a

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Mastering Long-Span Structures

Long-span structures often undergo large deformations under load, necessitating non-linear analysis techniques to

Feb 04, 2026

Lifetime Deflections of Long-Span Bridges under Dynamic and

Steady traffic growth may pose a safety hazard to in-service bridges, especially long-span bridges subjected to the

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Vibration Suppression Analysis of a Long-Span Bridge ...

The long-span bridge structures are loaded by service loads including traffic and/or wind loads almost every day. The

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