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Bridge

2018-10

[Monitoring an in-service railway bridge with a distributed fiber optic strain sensing system](#)

Van Der Kooi, K; Hoult, N; Le, H

To investigate the use of distributed fiber optic strain sensing systems, an in-service steel truss bridge that was built in 1902 had a fiber optic sensing system installed at midspan at the top and bottom chord connections. Three load scenarios were used: (a) static loading using a work train, (b) dynamic loading using a work train, and (c) dynamic loading using in-service increasing trains.

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2018-10

[Monitoring, modeling, and assessment of a self-sensing railway bridge during construction](#)

Butler, L et al

This study shows how integrating fiber optic sensor (FOS) networks into bridges during the construction stage can be used to quantify preservice performance. Details of the installation of a large FOS network on a new steel–concrete composite railway bridge in the United Kingdom are presented. An overview of the FOS technology, installation techniques, and monitoring program is also presented, and the monitoring results from several construction stages are discussed.

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2018-07

[Stress distributions in girder-arch-pier connections of long-span continuous rigid frame arch railway bridges](#)

Gou, H et al

Because of their large stiffness and spanning capability, continuous rigid frame arch bridges are attracting increasing interest in the development of high-speed railway networks in China. The internal loadings are associated with both the continuous rigid frame and arch substructural systems. Thus, the bridges are subjected to complex stresses, in particular, at

the girder-arch-pier connections. The evaluation of the mechanical performance and understanding of the stress distribution of the girder-arch-pier connection are critical for ensuring the effective design and condition assessment of the bridges. This paper investigates the stress distributions in the girder-arch-pier connections of the world's longest continuous rigid frame arch railway bridge, the Yichang Yangtze River Bridge.

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High Speed Rail

2018-09

Stiffness of coupling connection and bearing support for high-speed Maglev guideways

Zhang, L; Huang, J

Coupling connections and bearing supports have been widely used in high-speed maglev guideways. Accurate identification of their mechanical properties is necessary for guideway design and research. This paper presents an approach to estimate the rotational stiffness of the coupling connection and the vertical stiffness of the bearing support of maglev guideways.

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Light Rail

2018-05

Rail degradation prediction models for tram system: Melbourne case study

Falamarzi, A et al

Tram is classified as a light rail mode of transportation. Tram tracks experience high acceleration and deceleration forces of locomotives and wagons within their service life and also share their route with other vehicles. This results in higher rates of degradation in tram tracks compared to the degradation rate in heavy rail tracks. In this research, gauge deviation is employed as a representative of track geometry irregularities for the prediction of the tram track degradation. Data sets used in this research were sourced from Melbourne's tram system. For model development, the data of approximately 250 km of tram tracks are used. Two different models including a regression model and an Artificial Neural Networks (ANN) model have been applied for predicting tram track gauge deviation. According to the results, the performances of the regression models are similar to the ANN models. The determination coefficients of the developed models are above 0.7.

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2018-10

Rule extraction for tram faults via data mining for safe transportation

Gürbüz, F; Turna, F

One of the parameters that cause unsafety transportation is faults in railway transportation. Undergoing safety procedures and developing safety systems require awareness of what is

causing unsafe conditions. Data mining is a tool to extract information from historical data. One of the most common fields of transportation to apply data mining is fault analysis. In the present study the data set of 4-year record of tram faults from a railway transportation company in Turkey was obtained to carry out rule extraction from the occurrence of faults that cause delays in tram services. For this purpose, the authors used a rough set tool Rosetta as well as Weka for rule extraction.

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Rail

2018-07

Commuter health risk and the protective effect of three typical metro environmental control systems in Beijing, China

He, S et al

The Beijing metro system consists of eighteen lines, and approximately 10 million commuters take the metro daily. Despite the presence of three different environmental control systems, the metro's air quality has caused widespread concern. This study investigated the particulate matter (PM) concentrations in the metro system, and assessed the protective effect of the three environmental control systems.

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2018-07

Particulate matter concentrations and heavy metal contamination levels in the railway transport system of Sydney, Australia

Mohsen, M; Ahmed, M; Zhou, J

Sampling campaign was conducted over six weeks to determine particulate matter (PM) concentrations from Sydney Trains airport line (T2) at both underground and ground levels using DustTrak. Dust samples were collected and analysed for 12 metals (Fe, Ca, Mn, Cr, Zn, Cu, Pb, Al, Co, Ni, Ba and Na) by atomic emission spectroscopy. The findings suggested that underground PM concentrations were less influenced by the ambient background than at ground level. The metal concentrations decreased in the order of Fe, Cr, Ca, Al, Na, Ba, Mn, Zn, Cu, Ni, Co and Pb. The pollution index (PI) and enrichment factor (EF) values were calculated to identify the levels and sources of contamination in the underground railway microenvironments. PM was remarkably rich in Fe with a mean concentration of 73.51 mg/g and EF of 61.31, followed by Ni and Cr. These results noticeably indicated a high level of metal contamination in the underground environments, with the principal contribution from track abrasion and wear processes.

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Safety

2018-10

Suicide on the railways in Belgium: a typology of locations and potential for prevention

Strale, M et al

Suicide on railway networks comprises a serious public health problem. However, the geographical distribution and the environmental risk factors remain unclear. This study analyzed the geographic distribution of railway suicides in Belgium from 2008–2013 at the level of a railway section (average length of 3.5 km).

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Station

2018-10

Alleviating a subway bottleneck through a platform gate

Muñoz, J et al

This paper shows the results of an experiment in which a gate allowing only unidirectional flows was installed on the middle of a Metro platform. The results were very positive: operation of the Metro Line was improved, travel times were reduced, and both regularity and frequency of trains increased. Finally, the perception of the service by its riders also saw an improvement. The main cause of this impact is that the gate encourages riders to arrange themselves more efficiently on board the train allowing the platform to clear much more quickly.

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2018-11

Estimation of emergency evacuation capacity for subway stations

Wu, Y et al

To estimate evacuation capacity of subway stations under emergency conditions, a bilevel programming model of evacuee equilibrium is built by considering travel time on walking facilities with various congestion degrees. The upper-level model ensures the maximum utilization of facilities, whereas the lower level model is to minimize the evacuation time by determining how to guide evacuees to arrive at safety zones. An improved particle swarm optimization algorithm is designed to solve the model.

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2018-05

Prediction of daily entrance and exit passenger flow of rail transit stations by deep learning method

Zhu, H; Yang, X; Wang, Y

Based on the big data of rail transit IC card (Public Transportation Card), this paper analyzes the data of major dynamic factors having effect on entrance passenger flow and exit passenger flow of rail transit stations: weather data, atmospheric temperature data, holiday and festival data, ground index data, and elevated road data and calculates the daily entrance passenger flow and daily exit passenger flow of individual rail transit stations with data reduction.

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Timetable

2018-06

Exploring the complex relationship between railroad infrastructure, operating constraints, maximum speeds, and public schedules

Lu, A et al

Outside the railroad industry, passenger trip times are often treated as a performance measure or yardstick of the industry's health. However, many factors not known or well understood by casual observers affect trip times—indeed, some are recognized techniques utilized by infrastructure owners to deliver journey time reductions. Factors triggering running time modifications include: track (design, maintenance, layout); infrastructure (structures, signal, power, grade crossings); cant deficiency, tractive effort, braking rates; rules, operating practices, timetable speeds; and schedulers' decisions on train performance modeling, en-route adjustments, and dwell times. Historical operating documents issued by railroads can be used to reconstruct events associated with trip timing changes, but their ephemeral nature makes it difficult. Because some information is never written down, the rationale for certain modifications may be unknowable. Public timetables offer a general sense of trends in service offerings but don't show what was really happening. Opposing industry trends can actually give rise to similar schedule impacts, e.g. deferred maintenance and track rehabilitation both lead to longer journey times. Applying forensic analysis methodology to Penn Central's Mohawk/Buffalo Divisions revealed that some time degradations are correlated to downgraded infrastructure and vehicle issues, but long-term changes were balanced. Metro-North's New Haven Line case study reveals how new stations, necessary safety modifications, increasing congestion, and temporary construction delays all contributed to recent timing changes. To maximize system performance, operators must balance time, capacity, and reliability subject to an overarching constraint of safe operations.

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2018-05

The planners' perspective on train timetable errors in Sweden

Palmqvist, C; Olsson, N; Winslott Hiselius, L

Timetables are important for train punctuality. However, relatively little attention has been paid to the people who plan the timetables: the research has instead been more centred on how to improve timetables through simulation, optimisation, and data analysis techniques. In this study, the authors present an overview of the state of practice and the state of the art in timetable planning by studying the research literature and railway management documents from several European countries. The authors have also conducted interviews with timetable planners in Southern Sweden, focusing on how timetable planning relates to punctuality problems.

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Track

2018-08

[Assessment and evaluation of railway noise spread dependence on different types of sleepers](#)

Aleknaite, M; Grubliauskas, M

The aim of the work is to evaluate the dependence and the propagation of noise in the environment caused by train traffic, which depends on different types of sleepers. The results showed that the stretch with wooden sleepers was "quieter" at 3 dB than the section with concrete sleepers, in the sections where measurements were taken: Senieji Trakai-Rudiskes (section with concrete sleepers) and Rudiskes-Matuizos (section with wooden sleepers). The measurements carried out throughout the study showed that the fixed passage noise of the trains falls into the low frequency noise level (31.5–400 Hz).

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2018-05

[Fuzzy approach in rail track degradation prediction](#)

Karimpour, M et al

In this research, a short review of rail track degradation prediction models has been discussed before estimating rail track degradation for the curves and straight sections of Melbourne tram track system using Adaptive Network-based Fuzzy Inference System (ANFIS) model. The results from the developed model show that it is capable of predicting the gauge values with of 0.6 and 0.78 for curves and straights, respectively.

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2018-09

[Prediction of track deterioration using maintenance data and machine learning schemes](#)

Lee, J et al

The maintenance and renewal of ballasted track can be optimized in terms of time and cost if a proper statistical model of track deterioration is derived from previous maintenance history and measurement data. In this regard, quite a few models with simplified assumptions on the parameters have been suggested for the deterioration of ballasted track. Meanwhile, data driven models such as the artificial neural network (ANN) and support vector regression (SVR), which are basic ingredients of machine learning (ML) technology, were introduced in this study to better represent the deterioration phenomena of track segments so that the results can be directly plugged into the optimization schemes. For this purpose, the influential parameters of track deterioration have been selected based on the maintenance history, and two ML models have been studied to find the best combination of input parameters. Through numerical experiments, it was found that at least 2 years of maintenance data were needed in our case to obtain a stable prediction of track deterioration.

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Transit

2018-10

Mode choice and railway subsidy in a congested monocentric city with endogenous population distribution

Xu, S et al

The objective of this paper is to provide new insights into commuters' mode choice behavior in a monocentric closed city with endogenous population distribution, where a congested highway and a crowded railway provide commuting services for residents on a linear urban corridor. The authors first explore the typical equilibrium mode-choice patterns with exogenous city boundary and population distribution, and then incorporate the residents' mode choice into an urban spatial equilibrium model, in which the residents' household consumption, the residential location choice and the property developers' housing production are also explicitly modeled.

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Tunnel

2018-06

Management system of preventive maintenance and repair for reinforced concrete subway tunnels

Ishida, T et al

The authors propose a maintenance management system for reinforced concrete subway tunnels to perform efficient maintenance management in view of preventive maintenance and repair of distressed concrete. The proposed system consists of three subsystems and has been put into trial use on an actual subway line.

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