



ACRI Rail Knowledge Bank Update.



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Bridges

February 2017

[Efficient modelling techniques for vibration analyses of railway bridges](#) Svedholm, C

The world-wide development of new high-speed rail lines has led to more stringent design requirements for railway bridges, mainly because high-speed trains can cause resonance in the bridge superstructure. Dynamic simulations, often utilising time-consuming finite element analysis (FEA), have become essential for avoiding such problems. Therefore, guidelines and tools to assist structural engineers in the design process are needed.

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Environment

May 2017

[Comparative specific energy consumption between air transport and high-speed rail transport: a practical assessment](#) Chiara, B et al

This paper has the purpose of quantifying and comparing the specific energy consumption of air transport with that of high-speed rail transport; determining the ranges in which operating, sometimes also investing, in one of these two modes would be convenient from the usage viewpoint and from an energy perspective; determining where there is still

notable competition between these modes.

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Freight Services

August 2017

[Imperfect competition in a network industry: the case of the European rail freight market](#)

Laroche, F et al

This paper opts for a time varying approach to measure the competition on the European rail freight sector according to two questions: what is the current level of competition and how is this expected to evolve in the long run?

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Infrastructure

July 2017

[Corridor protection: planning and investing for the long term](#)

Infrastructure Australia

The paper shows that protection and early acquisition of just seven corridors identified as national priorities on the Infrastructure Priority List could save Australian taxpayers close to \$11 billion in land purchase and construction costs. These seven strategic corridors are: East Coast High Speed Rail Outer Sydney Orbital, Outer Melbourne Ring, Western Sydney Airport Rail Line, Western Sydney Freight Line, Hunter Valley Freight Line, Port of Brisbane Freight Line.

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Maintenance

August 2017

[Improvement of railway maintenance approach by developing a new railway condition index](#)

Sadeghi, J; Heydari, H; Doloei, E

The rapid development of high-speed tracks throughout the world, which increases the importance of the track passenger ride comfort (PRC), has created an urgent need for the consideration of PRC in the maintenance of railways. This paper develops a new railway

track conditions index which takes into account PRC.

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July 2017

[Integrated optimization on train scheduling and preventive maintenance time slots planning](#)

Luan, X et al

The authors address the problem of simultaneously scheduling trains and planning preventive maintenance time slots (PMTSs) on a general railway network. Based on network cumulative flow variables, a novel integrated mixed-integer linear programming (MILP) model is proposed to simultaneously optimize train routes, orders and passing times at each station, as well as work-time of preventive maintenance tasks (PMTSs).

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Passenger Services

July 2017

[Choice modelling with time-varying attributes, with an application to train crowding](#)

Collins, AT; Hensher, DA

This study is concerned with the treatment of time-varying attributes (TVAs) in discrete choice models, where the attributes are some measure of the quality of an alternative that changes over some relevant measure of time. Examples include public transport crowding, traffic congestion, and quality of life. Various methods for representing TVAs are considered, including a number of simplified approaches that only use a single measure, a decomposition approach that presents the amount of time spent in different conditions, and more complex representations that account for variability in the TVA outcome. A study of train crowding is used to test these alternative representations. The results indicate that the simplified approaches are problematic and may bias valuations of TVAs, and that the decomposition approach is less susceptible to these problems and allows for greater insight into potential threshold and nonlinear effects.

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March 2017

[The optimisation of rail vehicle bogie parameters with the fuzzy logic method in order to improve passenger comfort during passage over bridges](#)

Mizrak, C; Esen, I

Dynamic forces due to moving loads, especially during passages over bridges, have an even more significant effect on passenger comfort. In this study, a rail vehicle bogie with 10 degrees of freedom (DOF) and an Euler-Bernoulli beam bridge model were constructed in order to assess passenger comfort under moving loads. Bogie, and bridge and rail irregularities were coupled by superposition and the effect of rail vehicle velocity, wagon mass, and rail irregularity on passenger comfort were determined by means of frequency weighted acceleration values obtained through simulations performed with the Newmark- β method. Using an interface integrated with the fuzzy logic expert system, the bogie suspension parameters were optimised according to vehicle velocity, wagon mass, and rail irregularities. The rail vehicle acceleration values resulting from the optimised suspension parameters and the suspension parameters reported in the literature were simulated and compared with one another; it was determined that the suspension parameters optimised by the fuzzy logic expert system resulted in an improvement in passenger comfort by over 34% at high velocities.

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April 2017

[Understanding urban rail in-vehicle activities: an activity theory approach](#)

Camacho, T et al

Public transport in-vehicle activities are activities undertaken by passengers while en-route to their destination. Recent focus has been given to this subject, as evidence accrues to demonstrate the influence that in-vehicle activities have on the way passengers perceive and assess the service as a whole. Still, most of research regarding public transport in-vehicle activities has been descriptive in nature which makes it difficult to study public transport in-vehicle activities from an established perspective, resulting in scattered knowledge about activities, underlying motives, and the impact that activities can have on passengers. This research makes use of a novel approach to the study of urban rail in-vehicle activities using activity theory.

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[Timetabling](#)

June 2017

[Methodology for determining dwell times consistent with passenger flows in the case of Metro services](#)

D'Acerno, L et al

A crucial factor in the task of timetabling entails evaluating dwell times at stations. The innovative feature of this paper is the analytical definition of dwell times as flow dependent. Our proposal is based on estimating dwell times according to the crowding level at platforms and related interaction between passengers and the rail service in terms of user behaviour when a train arrives. An application in the case of a real metro system is provided in order to show the feasibility of the proposed approach.

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July 2017

Passenger oriented railway disruption management by adapting timetables and rolling stock schedules

Veelenturf, L; Kroon, L; Maróti, G

This paper describes a real-time disruption management approach which integrates the rescheduling of the rolling stock and the timetable by taking the changed passenger demand into account. The timetable decisions are limited to additional stops of trains at stations at which they normally would not call. Several variants of the approach are suggested, with the difference in how to determine which additional stops should be executed. Real-time rescheduling requires fast solutions. Therefore a heuristic approach is used. The authors demonstrate the performance of the several variants of their algorithm on realistic instances of Netherlands Railways, the major railway operator in the Netherlands.

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Transit

August 2017

How well does BRT perform in contrast to LRT? An Australian case study using MetroScan_TI

Hensher, DA; Ellison, R; Ho, CQ

While there have been a number of comparative assessments of BRT and LRT (in all of its possible manifestations), with a focus on one or more elements of patronage demand, and costs of construction and operation, there has, with few exceptions, been a preference for LRT which some might describe as linked to emotional ideology rather than anything to do with factual evidence on the costs, benefits and economic impact of each modal investment. In this chapter, we present a new planning tool, MetroScan as a quick-scan tool that can be used to assess the merits of BRT and LRT.

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June 2017

Light rail transit cost performance: opportunities for future-proofing

Love, P et al

In tackling cost increases in capital expenditures (CAPEX), emphasis is placed on mitigating strategic misrepresentation and optimism bias, which has hindered the public sectors ability to embrace innovation, particularly with regard to the justification and adoption of LRT. More often than not, operational expenditure (OPEX) is neglected, and is not considered a part of the transportation cost performance literature. The aim of this paper is to examine the equivocality that surrounds the determination of cost performance of LRT projects.

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June 2017

What explains rapid transit use? Evidence from 97 urbanized areas

Shyr, O et al

Survey of 97 mass rapid transit (MRT)/light rail transit (LRT) systems; Statistical tests of 4 key variables; Scale economies are present; Affordability matters; MRT/LRT networks work best in large and dense cities; and MRT/LRT systems with moderate coverage are less successful.

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Rail Knowledge Bank



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