STRESZCZENIA

Danuta BRYJA, Ryszard HOŁUBOWSKI
Politechnika Wrocławska

Modelowanie belkowych mostów kolejowych Z zastosowaniem metody GFEM. Część I. Sformułowanie teoretyczne

W pracy przedstawiono model obliczeniowy belkowych mostów kolejowych z losowo zmiennymi parametrami podsypki. Model, w którym podsypka toru kolejowego jest ciągłym podłożem lepko-sprężystym, sformułowano metodą elementów skończonych w ujęciu Galerkina (GFEM). Alternatywnie zastosowano typowe funkcje kształtu elementu skończonego w postaci wielomianów Hermite'a i funkcje specjalne, które wyprowadzono na podstawie ścisłego rozwiązania jednorodnego równania statycznego, opisującego problem zginania belki spoczywającej na podłożu sprężystym. Wyprowadzono równania ruchu opisujące sprzężone, pionowe drgania dźwigara mostowego i toru kolejowego w obrębie mostu i w strefach dojazdowych. Drgania te są wymuszone przejazdem pociągu ze stałą prędkością, przy czym pociąg jest traktowany jako zbiór ruchomych mas skupionych. Zaproponowany model mostu umożliwi w przyszłych badaniach efektywną analizę stochastyczną drgań z zastosowaniem metody symulacyjnej Monte Carlo.

Modeling of railway beam bridges by using GFEM method. Part I. Theoretical formulation

S u m m a r y

The paper presents the GFEM algorithm for modeling railway beam bridges with random parameters of rail bad (ballast) treated as a continuous non-inertial foundation. To approximate dynamic displacements of the bridge girder and rails, special local shape functions have been derived on the basis of the exact solution of the static equation of an Euler beam resting on elastic foundation. Alternatively, Hermite's shape functions are used. Vertical bridge vibrations caused by the train moving at constant velocity are considered under assumption that the train is idealized as a set of moving masses. In order to simulate the dynamic state of the system when the train arrives at the bridge, it is assumed that the train starts sufficiently far ahead of the bridge girder. The approach zones of the rail track at both bridge ends are analyzed as an Euler beam on viscoelastic foundation. The presented algorithm is expected to be effective in Monte Carlo simulations. In that case it can be easily expanded by taking into account more realistic physical model of a train in the form of MDOF system.

Danuta BRYJA, Ryszard HOŁUBOWSKI, Monika PODWÓRNA
Politechnika Wrocławska

Modelowanie belkowych mostów kolejowych Z zastosowaniem metody GFEM. Część II. Testy numeryczne

Tematem pracy są testy numeryczne modelu obliczeniowego belkowych mostów kolejowych z podsypką w postaci ciągłego podłoża lepko-sprężystego. Model sformułowano w odrębnej pracy [1] metodą GFEM, z uwzględnieniem losowej zmienności parametrów podsypki. Zakres omawianych testów numerycznych ogranicza się do zagadnień deterministycznych i obejmuje: zagadnienie własne, drgania wymuszone przejazdem pociągu ze stałą prędkością oraz stowarzyszone z nimi rozwiązania quasi-statyczne. Przyjęto następujące cele badań: a) dobór funkcji kształtu, b) weryfikacja modelu mostu za pomocą komercyjnego programu SOFiSTiK, c) ustalenie dostatecznej gęstości podziału układu na elementy skończone. Testy wykazały poprawność sformułowania algorytmu i potwierdziły oczekiwaną bardzo dobrą efektywność jego działania. Algorytm umożliwia istotne zmniejszenie rozmiaru zadania, w porównaniu ze standardową metodą elementów skończonych.

Modeling of railway beam bridges by using GFEM method. Part II. Numerical tests

S u m m a r y

The paper presents numerical tests of the GFEM algorithm for modeling railway beam bridges where ballast is treated as a visco-elastic, non-inertial continuous medium. Main objectives of the numerical analysis were the following: 1) to choose appropriate finite element shape functions, 2) to verify the presented GFEM model by comparing to the FEM model constructed in SOFiSTiK software, 3) to determine the sufficient finite element segmentation with regard to accuracy of static and dynamic solutions corresponding to the passage of train. Natural frequencies of an exemplary bridge have been discussed as well as time histories of forced vibrations due to moving forces or moving masses which constitute the train model.

Michał ĆWIK, Marian GIŻEJOWSKI
Politechnika Warszawska

Adam GOLIGER
CSIR Built Environment, Republika Południowej Afryki

Porównanie oddziaływania wiatru na budynki według norm polskich i południowoafrykańskich. Część 1. Podstawy normalizacji obliczeń

Przedstawiono zasady określania oddziaływania wiatru na budynki według norm krajowych i południowoafrykańskich. Uwzględniono charakterystyki prędkości wiatru, sposób konwersji na ciśnienie prędkości wiatru oraz metody obliczania obciążenia powierzchni i konstrukcji, a także porównano procedury obliczeniowe.

Comparison of wind actions on buildings according to polish and south-african codes. Part 1. Basis for codification procedures

S u m m a r y

Aspects of the wind action determination for buildings according new South African and Polish design codes are described. The wind speed, conversion rules for velocity pressure and wind pressure on surfaces and construction as well as calculation procedures are included.

Michał ĆWIK, Marian GIŻEJOWSKI
Politechnika Warszawska

Adam GOLIGER
CSIR Built Environment, Republika Południowej Afryki

Porównanie oddziaływania wiatru na budynki według norm polskich i południowoafrykańskich. Część 2. Przykłady obliczeń

Na trzech przykładach, tj. typowego budynku mieszkalnego jednorodzinnego, hali przemysłowej i wysokiego budynku biurowego, przedstawiono procedury obliczania oddziaływania wiatru według norm polskich i południowoafrykańskich na konstrukcje budowlane. Porównano wyniki obliczeń i wyciągnięto wnioski.

Comparison of wind actions on buildings according to polish and south-african codes. Part 2. Illustrative examples

S u m m a r y

For three examples – a typical family residential building, industrial building and high-rise Office building – procedures of the evaluation of wind action according to Polish and South African codes are presented. Obtained results are compared and remarks are formulated.

Ivan HYBEN, Marcela SPIŠÁKOVÁ
Technical University of Košice

Ways of demolition works vs. final product of recycling

The civil engineering is one of the significant holders of permanent value to society. On the other hand, construction and demolition waste (CDW) generated during this activity presents 22% of the total waste stream in European Union [1]. However, this waste can be recycling through the existing technological methods and processes. Considering this fact, is necessary to begin to understand the waste as a source of secondary material, which allows the sawing of natural raw materials. The ways of treatment and subsequent use of construction and demolition waste (CDW) depends strongly of the demolition waste realization, because the construction and demolition waste arises mainly at this works. This paper deals with the possibilities of realization of demolition works and the consequent ways of recycled material use.

Natalia JUNÁKOVÁ, Magdalena BÁLINTOVÁ
Technical University of Košice

Prediction of sediment inflow to the klusov-hervartov reservoir

Sediment transport through water erosion is an environmental problem, having widespread and serious negative impact on agricultural production and mainly on water quality. Sediments reduce the stream capacity, reservoir's accumulation capacity and act as the ultimate sink of many pollutants (nutrients, heavy metals, pesticides). For assessment the water management and environmental impact of sediments on water quality, first, it is necessary to determine the total amount of sediments deposited in reservoirs, often originated from erosion of agricultural production areas.
This paper deals with the method for determination of the sediment quantity in the small water basin Klusov-Hervartov, which is based on combining the soil loss calculation using the Universal Soil Loss Equation and sediment delivery ratio. The calculation is supplemented with the determining of the detached sediment amount during 5 cropping periods in the year depending on land use in the river catchment's area. Total quantity of sediments trapped in reservoir is determined according to the reservoir trapping efficiency by using Brune and Dendy method. Soil loss is computed based on the particular crop rotations in the catchment during 10 years.

Galina KALDA, Kinga KLIŚ
Politechnika Rzeszowska

Rozwój małej energetyki wodnej na Podkarpaciu

W artykule przedstawiono ogólne informacje o zasobach wodnych w województwie podkarpackim, charakterystyki małej energetyki wodnej i rodzaje elektrowni, obliczenia turbiny wodnej, przybliżonej wartości rocznej produkcji energii i opłacalności inwestycji.

Small-scale water power industry development in Podkarpatski region

S u m m a r y

The paper represents general information about water power in Podkarpatski region, characteristics of water power industry and types of power stations, water turbine designing, power cost estimate and investment warranty.

Galina KALDA, Agnieszka SMORĄG
Politechnika Rzeszowska

Budowa i obliczanie powierzchni kolektorów słonecznych

W artykule przedstawiono konstrukcję kolektorów słonecznych oraz ich parametry techniczne. Obliczono powierzchnie kolektorów zlokalizowanych w różnych regionach Polski w celu wybrania miast z najlepszym nasłonecznieniem.

Structure and operation of solar collectors

S u m m a r y

The paper represents structure of solar collector and their technical parameters. The collector surface area is calculated for various of Poland in order to determine on the base of calculated areas assessment the city which would have the most solar intensity.

Maria KOZLOVSKÁ, Zuzana STRUKOVÁ
Technical University of Košice

Integration of occupational safety analysis in construction projects

Construction is world over thought to be a very hazardous industry. According to the International Labour Organization, it accounts for 30-40% of the world`s fatal injuries and non-fatal injuries occur most frequently than in other industries. Many different approaches to safety should be considered and implemented in order to reduce on-site safety risks and to achieve the goal of less or zero injuries. One of the key steps to achieve adequate safety levels at the construction phase of the project consists in safety risk analysis in pre-construction phase. The paper deals with the approaches to occupational safety risks analysis in construction and introduces the methodology of safety hazards identification and evaluation of risk levels for all identified hazards. The methodology was applied in the project of Shopping Centre Aupark in Košice. In this application the specific nature of construction process, uniqueness of construction site workplace, two degree decomposition of construction safety hazards and their synergy effects are considered.

Eva KRÍDLOVÁ BURDOVÁ, Silvia VILČEKOVÁ
Technical University of Košice

The environmental assessment of office buildings in Slovakia

The Slovak building environmental assessment system has been processed. The main fields and relevant indicators are proposed on the base of available experience database analysis from environmental, social and economic performance of buildings. The existing systems and methods used in many countries were the base of new system development. The developed building environmental assessment system (BEAS) deals with evaluation of site selection and project planning, building construction, indoor environment, energy performance, waste and water management. The aim of paper is introduced the BEAS developed in Slovakia. The paper also presents the evaluation of selected office buildings in the phase of their conceptual design.

Vlasta ONDREJKA HARBULÁKOVÁ, Nadežda ŠTEVULOVÁ, Martin REPKA
Technical University of Košice

Alena LUPTÁKOVÁ
Slovak Academy of Science

Study of different types of corrosion processes simulated in model conditions

Existing evidence has shown that in many concrete structures exposed to aggressive aqueous environments corrosion problems are present. In places like marine environments, sewers, agricultural structures, underground and hydraulic structures, chemical plants, industrial structures, liquid-containing structures these problems are especially very well visible. Degradation mechanisms such as alkali silica reaction, chloride penetration, carbonation, acid corrosion, leaching etc. have necessitated the renewal of complete structures. Leaching and acid corrosion mechanisms were chosen for detailed study and partial results are present in this paper. Concrete samples without coal fly ash addition and as well as sample with addition of 5% resp. 10% of coal fly ash were used for experiment. Paper is aimed on study and evaluation of chemical corrosion and leaching due to sulphuric acid/distilled water influence on concrete samples. After the experiment of exposure of concrete samples to these different environments the concrete surface changes and the pH values changes of leachate were measured and evaluated.

Lenka PALAŠČÁKOVÁ, Adriana EŠTOKOVÁ, Magdalena BÁLINTOVÁ
Technical University of Košice

Phosphorous content evaluation in cements in Slovak Republic in frame of eco-labelling process

Phosphorous enters the clinker minerals and negatively affects the phase composition clinker, and thus the quality of cement. In environmental point of view, phosphates coming into the water cause the eutrophication processes. The environmental criteria including phosphorous content for materials and products are stated assessment of type I which determines is the most used evaluation process in Slovak Republic. Cements are one of the building product groups for which the required criteria are stated and the national eco-label is possible to obtain. Cements supplied on the market must fulfil the basic requirements stated by technical norms and regulations in order to achieve certain properties in concrete and human safety. Cements environmental criteria within the certification process include requirements for limit value of phosphorous (less than 3% of P_2O_5). The content of phosphorous expressed as P_2O_5 was in all measured cement samples less than stated limit in eco-labelling process.

Katarzyna PIETRUCHA-URBANIK, Andrzej STUDZIŃSKI
Politechnika Rzeszowska

Failure analysis of the Krosno water network

In the article analysis of failures of the Krosno water network has been presented. In the work the analysis of the failure frequency for individual kinds of waterworks (main, distribution and water supply connections) on the example of the Krosno water network was also presented. An analysis based on exploitation data of the water network get from Municipal Services Office in Krosno in years 2005-2009 was carried out. In the work the analysis of the failures depended on the diversity of applied materials, age and diameters for individual kinds of waterworks was also presented.

Analiza awaryjności sieci wodociągowej Krosna

S t r e s z c z e n i e

W pracy przedstawiono analizę awaryjności sieci wodociągowej Krosna. Zakres pracy obejmuje analizę wskaźników intensywności uszkodzeń przewodów magistralnych, rozdzielczych oraz przyłączy wodociągowych na przykładzie sieci wodociągowej Krosna. Analizę przeprowadzono na podstawie danych eksploatacyjnych sieci wodociągowej w latach 2005-2009, uzyskanych od MPGiK w Krośnie. Dokonano analizy awaryjności ze względu na zastosowany materiał, wiek oraz średnicę dla poszczególnych rodzajów przewodów wodociągowych.

Katarzyna PIETRUCHA-URBANIK, Andrzej STUDZIŃSKI
Politechnika Rzeszowska

Gwarantowany stopień dostępności usług wodociągowych

Gwarancja staje się nową kategorią decydującą o komforcie korzystania z systemów zbiorowego zaopatrzenia w wodę (SZZW). Artykuł stanowi kontynuację badań nad pojęciem gwarancji w branży wodociągowej. W pracy przedstawiono sposób wyznaczania gwarantowanego stopnia dostępności usług wodociągowych oraz aplikację metody na przykładzie miasta Rzeszowa.

Guaranteed level of waterworks services availability

A b s t r a c t

The aim of his paper is to present the novel approach for risk assessment in combination with failure and consequence analysis as to evaluate the degree of availability of service of water infrastructure. In addition to this data, methodologies for calculating the guaranteed levels of the availability of water services are also presented, on the example of the city Rzeszow.

Peter PLATKO, Stanislav KMEŤ
Technical University of Košice

Prototype of an active tensegrity unit

Tensegrity structures and hybrid tensegric structures can be defined as spatial systems, which consist only from set of compressed members and set of tensioned members and they can be used to developing systems with a possibility of an active control. Structures with an active control or active structures are equipped with sensors and actuators and they are subjected to continuous monitoring. A test facility with an active tensegrity unit and some basic experimental tests which were carried out are presented in the paper. Results obtained from the experimental tests are compared with the FEM created in ANSYS.

Sergej PRIGANC, Štefan KUŠNÍR, Peter SABOL

Technical University of Košice

Analysis of concrete structures after interference in the support system of the building – part 1

The paper describes the process of concrete structures after interference in the support system of the building. The material properties, the experimental verification, static analysis of the structure and design of its reconstruction are listed. Reconstruction of the bearing structure had to be implemented in a very short time.

Sergej PRIGANC, Štefan KUŠNÍR, Peter SABOL
Technical University of Košice

Analysis of concrete structures after interference in the support system of the building – part 2

The paper describes the process of concrete structures after interference in the support system of the building. The material properties, experimental verification, static analysis of the structure and design of its reconstruction are described. Reconstruction of the bearing structures had to be carried out in a very short time.

Janusz RAK, Katarzyna PIETRUCHA-URBANIK, Monika SOLECKA
Technical University of Rzeszow

Changeability of water consumption in the city of Rzeszów

The aim of the work is the analysis of water consumption in Rzeszów city. The quantity of produced water in Water Plants: Zwięczyca I and Zwięczyca II were performed for years 2007-2009. The individual average twenty-four hour water consumption per one inhabitant was estimated. A stable decrease was observed in annual water consumption in years 2000-2009. On the example of housing estate Nowe Miasto, the analysis of water consumption concerning the heights of the buildings was made. The biggest individual water consumption was marked in ten-storey house, and the smallest in single-family house. The next step regard the water consumption depending on the days in week. The biggest water consumption was in Thursdays, and the smallest in Sundays. Also the maximum and minimum twenty four hour water consumption in the division into months in 2009 year were determined.

ZMIENNOŚĆ ZUŻYCIA WODY W MIEŚCIE RZESZOWIE

S t r e s z c z e n i e

W pracy przedstawiono analizę zużycia wody w mieście Rzeszowie. Dokonano analizy wyprodukowanej i uzdatnionej wody w ZUW I oraz ZUW II w latach 2007-2009. Oszacowano jednostkowy wskaźnik zużycia wody. Analiza zużycia wody w Rzeszowie wykazała, że zapotrzebowanie na wodę w ciągu roku jest nierównomierne i podlega wahaniom. Przedstawiono zużycie wody w zależności od wysokości zabudowy. Największe zużycie wody zaobserwowano w piętrowych blokach z płyt, natomiast najmniejsze – w domach jednorodzinnych. Wykazano dużą prawidłowość zużycia wody w cyklu tygodniowym – w poniedziałek zużycie wody jest niskie, następnie wzrasta i największą wartość osiąga w środku tygodnia. Zestawiono doby o największym i najmniejszym zużyciu wody przez odbiorców w poszczególnych miesiącach w 2009 r.

Tomáš RENČKO, Anna SEDLÁKOVA

Technical University of Košice

Implementation of ventilated air cavities and problems with thermal bridges

Historical buildings generally have no, or only have a passive protection of structures against the ingress of moisture in contact with soil. Materials embedded in structures of these buildings are often saturated with moisture. When reconstructing, we must apply a different methodology than when reconstructing the newer buildings. Differentiated treatment is affected by traditional construction technologies and also by the mechanical and physical properties of building materials. As regards listed historic monuments, special „barrier" is constituted by the monument protection office, or rather the opinion of the representative of the monument protection office. Its priority is the selection of those remedial treatments, which, if not stop the spread of moisture, at least eliminate it. In all of that there is the emphasis on the methodology of preservation of historical monuments and constructional possibilities of historic buildings. With respect to the abovementioned requirements, the acting humidity can be effectively removed, using ventilated air cavities. These are commonly used in connection with remedial treatments of damp masonry, especially in historic buildings.

Małgorzata STOJEK
Politechnika Krakowska

Zastosowanie falowych funkcji kształtu w zagadnieniach propagacji fal – przegląd metod

Otrzymanie efektywnych metod dyskretyzacyjnych dla równania Helmholtza w zakresie wysokich częstotliwości zostało uznane za jedno z największych wyzwań dla analizy numerycznej XXI wieku, ze względu na tzw. dyspersję numeryczną powodującą propagację kumulującego się błędu rozwiązania na cały obszar (tzw. *pollution effect*). Zaproponowano wiele nowych niestandardowych sformułowań, w tym wykorzystujących wiedzę o oscylacyjnym charakterze rozwiązania, celem zniwelowania tego efektu i poprawy efektywności wielomianowych elementów skończonych. W artykule krótko zarysowano przegląd nowych MES opartych na funkcjach falowych oraz podano wybrane publikacje dotyczące tego zagadnienia.

Application of wave-based shape functions to wave propagation phenomena – review of methods

A b s t r a c t

The efficient finite element discretization of the Helmholtz equation at high frequencies has been recognized as an outstanding challenge in numerical analysis of XXI century because of numerical dispersion, or what is often referred to in the literature as the pollution effect. A number of FEMs have been proposed to alleviate this effect, and improve on the unsatisfactory performance of the polynomial FEM. In this paper we shortly outline the recent advances in non-standard finite element formulations with wave based basis functions and provide a respective bibliography review.

Andrzej STUDZIŃSKI, Katarzyna PIETRUCHA-URBANIK

Politechnika Rzeszowska
Krzysztof CHMIELOWSKI
Uniwersytet Rolniczy w Krakowie
Marta KUBICKA
Absolwentka Politechniki Rzeszowskiej

Analiza zużycia wody miasta Kańczugi

Celem pracy jest analiza zużycia wody miasta Kańczugi. Oszacowano jednostkowe średniodobowe zużycie wody na jednego mieszkańca oraz wyznaczono straty wody. Najwyższe miesięczne zużycie wody zanotowano we wrześniu, najmniejsze w listopadzie i grudniu. W pracy przedstawiono szczegółową analizę struktury zużycia wody, m.in. ze względu na cele przemysłowo-usługowe.

The analysis of water consumption in Kańczuga city

A b s t r a c t

The aim of the work is the analysis of water consumption in Kańczuga city. The individual average twenty-four hour water consumption per one inhabitant was estimated. The next step regard the water losses. The biggest monthly water consumption was in September, and the smallest in November and December. Also the water consumption in the division of place of living (in single-family houses and flats) and industrial and service purpose were determined.

Renáta VARGOVÁ
Technical University of Košice

Evaluation of the experiments with respect to simulation techniques

The paper presented focuses on the comparison of the measurement results obtained in laboratory experiments on steel members subjected mostly to bending in the elastic-plastic stage. Special attention is paid to an evaluation of the elastic and plastic bending load capacity, with particular emphasis on the statistical processing of resistance and geometrical characteristics of steel members. Some results of the statistical study and experimental research are presented in the form of graphs and tables.
