Evaluation of Effects of Traffic Variables on the Noise Levels Using SoundPlan V6.5[†]

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ABSTRACT

In recent decades, noise pollution has been a worldwide concern. The health effects of noise pollution include noise-induced hearing loss, sleep disturbance, performance loss, annoyance, cardiovascular problems, and cognitive impairment in children. In this study, noise maps were prepared using SoundPlan 6.5 for D-100 Highway around Okmeydani İstanbul. The effects of traffic volume, composition, and speed and pavement surface type on the number of people exposed to noise levels above threshold for annoyance, sleep disturbance, and cardiovascular diseases were investigated. Noise reduction strategies in terms of speed limit, public transportation, heavy vehicle traffic, and pavement type were proposed.

Keywords: Highway noise, SoundPlan, noise map, noise and health.

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Determination of Spatial Distribution of Precipitation on Poorly Gauged Coastal Regions: Eastern Black Sea Region[†]

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ABSTRACT

Determination of spatial distribution of precipitation has an importance in terms of hydrological applications and water resources assessment. Particularly, the effects of orography and coastline on precipitation distribution should be taken into account in mountainous and/or coastal regions. This necessity is complicated by the limited number of rain gauges which have also a nonhomogenous distribution. In this study, it is aimed to determine the spatial distribution of precipitation for the coastal part of the Eastern Black Sea Region. It can be said that this study is the first in terms of combination of precipitation distribution on both hillside and coastal part by using two different approaches. One of these approaches is the water balance that reflects the precipitation distribution on hillside. The other one depends on the regression equations which explains the precipitation variability on coastline and valleys, for the coastal part of the Eastern Black Sea Region.

Keywords: *Precipitation distribution, Eastern Black Sea Region, isohyetal map.*

Modeling of Seasonal Precipitation with Geostatistical Techniques and Its Estimation at Un-gauged Locations[†]

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ABSTRACT

Precipitation is a meteorological data exhibiting large variations both temporally and spatially. There are quite a few research publications in literature related to temporal variation of precipitation. In this study, the spatial variation of seasonal precipitation is investigated using the monthly precipitation data measured all over Turkey. For this purpose, the monthly average values pertaining to the January–December period based on recorded data of at least 20-year length observed at 200 rain-gauging stations existing in Turkey are used. It is determined that the precipitation maps of four seasons can be depicted by a Gaussian type semivariogram and the spatial variation of seasonal precipitation can be estimated by this geostatistical method with sufficient accuracy. The outcome of the study enables the magnitude of seasonal precipitation at ungauged geographical locations to be estimated easily with sufficient accuracy.

Keywords: Seasonal precipitation, geostatistics, kriging, semivariogram.

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Fast Converging Moment Distribution Algorithm for Structural Analysis on Smartphones[†]

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ABSTRACT

Throughout the construction, unforeseen loading combinations on the scaffolding and the temporary facilities may occur. Since the site engineers have to take quick decisions, they make intuitive decisions, which may cause failures. In this study, moment distribution method based structural algorithm, which can run on handheld devices, is proposed to assist site engineers. Conventional moment distribution method is improved to solve the frames that are free to sidesway and settlement at once. As a result, the proposed algorithm can be efficiently implemented on hand-held devices, which have limited memory and processing power. Whereby, the site engineer can analyze any construction phase real-time and immediately take sound decisions.

Keywords: *Moment distribution method, slope-deflection, IT in construction, decision support system.*

Trend Analysis of Streamflows at Some Gauging Stations Over the Kizilirmak River[†]

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ABSTRACT

In this study, a new trend method recently proposed by Şen is used for monthly streamflow data of four different stations, Sefaatli, Kuylus, Salur Bridge and Bulakbasi, selected from the Kizilirmak Basin in Turkey. The Mann-Kendall trend test is also applied to the same data, and the results are discussed. According to the Mann-Kendall test, a significantly decreasing trend is found for the Sefaatli and Salur Bridge stations while there is no trend in the Kuylus and Bulakbasi stations at a significant level of 95%. Different trends are found for the low, medium and high streamflows of each station in view of the Şen trend test. As a result, it can be said that the proposed new method of Şen can identify the trends of low, medium, and high streamflows.

Keywords: Streamflow, Mann-Kendall test, şen trend test, Turkey.

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Analysis of Environmental Performance of Turkish Contractors[†]

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ABSTRACT

Improving their environmental performance enables contracting companies to decrease costs and increase their profit margins thus gaining competitive edge in international markets, besides contributing to improving of the environment. Research points to the necessity of selecting environmental performance indicators that are appropriate for the type of activities and the performance targets. Currently, however, no broadly accepted, comprehensive environmental performance assessment approach exists that is particularly suited to the activities of contractors. In this research, suitable indicators for the assessment of environmental performance of contractors and their relative weights have been determined through a staged-approach involving interviews, field surveys and case studies, and the environmental performances of the Turkish contractors are analyzed in various aspects based on these indicators. Strategies are proposed, in the light of the findings of the study, to ameliorate the environmental performance of the building industry.

Keywords: *Environmental performance, performance measurement, sustainable construction, Turkish contractors.*

Mesoscopic Analysis of the Behavior of Porous Concrete under Impact Loading[†]

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ABSTRACT

Porous concrete is a special type of cementitious material incorporating a high amount of meso-sized air pores that make its mechanical characteristics markedly different from normal concrete. The objective of this numerical study is mesoscopically analyzing the behavior of porous concrete under dynamic loading. In the finite element analyses, explicit direct integration method was adopted. Concrete Damage Plasticity Model was selected to define the material properties of the cementitious phases. With the aim of realistically representing porous concrete as a four-phase material, a mesh generation program was developed where each phase was separately defined. In order to better investigate the effects of the properties of pores, model porous concretes were also analyzed in the form of plain concrete meshes incorporating circular pores. The numerical analysis results of real concrete mixtures were in good agreement with the experimental results both in terms of quantifying the impact strength as well as demonstrating a realistic crack pattern formation for the porous concretes that have been analyzed.

Keywords: *Explicit time integration, mesoscopical analysis, porous concrete, concrete damaged plasticity*

Alkali-Silica Reaction Expansions and the Extent of Alkali Leaching in Concretes Containing Basalt and Waste Glass as Aggregate[†]

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ABSTRACT

Alkali-silica reaction (ASR) which takes place between amorphous silica in the aggregate and alkalis in the pore fluid is one of the durability problems causing deterioration of mortars. In this study, alkali-silica reactivity of various mixtures was evaluated according to AAR-3 and AAR-4 tests developed by RILEM. For determining the extent of alkali leaching from the specimens during these accelerated tests, samples were taken from the water accumulations at the bottom of the containers and sodium and potassium concentrations were determined using atomic absorption spectrometry. Results show that although a significant amount of alkalis can leach out, particularly waste glass aggregate leads to considerably high expansion levels.

Keywords: *Alkali silica reaction, alkali leaching, basalt, waste glass.*

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Infrastructure Asset Management: Case of Istanbul Ataturk Airport Terminal Building[†]

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ABSTRACT

Advances in technology, changes in the regulations, and budget constraints enforce stakeholders of the infrastructure sector to improve their asset management performance. Asset management guarantees a reasonable return, ensures increased service quality and reduces the safety risks. The major objective of this paper is to present asset management as an effective way of operating and maintaining infrastructure assets. The paper introduces the principles of the asset management approach, reviews the areas of implementation, and highlights the benefits and challenges in the field of asset management. The paper also investigates the asset management system of the Istanbul Ataturk Airport terminal building that is selected as a case study. The case study identifies different components of the asset management process including how it has been established and used, what benefits it has brought and how it can be improved.

Keywords: *Infrastructure, asset management, Istanbul Ataturk Airport*

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Seismic Performance of Gedikbulak School Building Revisited[†]

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ABSTRACT

After the Van Earthquakes of October 23 and November 9, 2011 a large number of buildings were damaged. A team of experts from the Istanbul Technical University, the Earthquake Engineering and Disaster Management Center investigated numerous buildings including schools to determine their damage levels and to decide whether they can be used further for education. One of the most remarkable field inspections was observation of the damages in the Gedikbulak School building which has been the only school building even the only public building experiencing total damage. The site observations and collected information reveal that the building had several shear walls located in two directions besides columns and beams. The building had been constructed by adopting one of the sample projects of the Ministry of Education. However, site observations have shown that the concrete quality and workmanship used in the building were quite poor. In this paper, the damage records of the building obtained from the field observations are given and the structural system is modeled and analyzed by adopting the structural layout obtained from the archives of the Ministry of Education. The study is carried out by using the linear and nonlinear analysis by employing plastic hinge assumption in the columns and fiber assumption in the shear walls. Seismic performance assessment of Gedikbulak school building is studied in view of the design shortcomings and the maximum earthquake effects. Numerical results are compared with field observations. Finally, design recommendations and seismic evaluation of school buildings are presented.

Keywords : *Reinforced-Concrete, Van Earthquake, damage assessment, school building.*

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Geotechnical and Support Design of Suruç Tunnel, Turkey's Longest Irrigation Tunnel[†]

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ABSTRACT

This research concerns with geotechnical and support designs along the Suruç tunnel, which will be used for irrigation of the Suruç Plain. The tunnel has a diameter of 7.9 m. It will be the Turkey's 1st and the World's 5th longest irrigation tunnel (17.2 km). The tunnel runs through limestone and marly formations. Field studies include rock mass characterization (by using RMR, Q and GSI systems), discontinuity surveying, drilling, permeability tests and sampling. Support requirements were determined by using the rock mass classification systems, and evaluated by the convergence-confinement method and Plaxis 8.2 software. The minimum deformations (0.90 mm) occured in the precast lining.

Keywords: *Rock mass classification system, Hoek-Brown failure criterion, Convergence confinement method, numerical analyses, Tunnel support design, Suruç Tunnel.*

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Investigation of the Factors Affecting Waiting Time in Public Transportation: Reliability, Passenger Information System and Physical Conditions[†]

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ABSTRACT

Waiting time in public transportation is one of the most important dimensions of the level of service perceived by the passengers. Excessive waiting times may turn into a utility function component that change the mode and route choices of passengers, especially for the urban bus transportation operated under the effect of traffic conditions. In this study, the waiting times in urban bus systems are predicted by using the effects of reliability and passenger information systems, together with the physical conditions of bus routes and stops. As the result of the constituted linear multiple regression models, it is found that the existence of passenger information system and reliability have reducing effect on waiting time by 2 and 1.3 minutes, respectively. Besides, it is concluded that the passenger information systems are more efficient if they are implemented for the stops conveniently used according to their geometry and the ones used by the lines coming from the city center.

Keywords: *Public transportation, reliability, passenger information system.*

Numerical Modeling of Two Dimensional Flood Wave Propagation in Residential Areas After the Dambreak[†]

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ABSTRACT

Although dam break failures are very rare events, dams can fail with little warning and the damage at the downstream of the dam due to the flood wave can be catastrophic. Therefore from risk point of view, understanding the consequences of a possible dam failure is critically important. This study discusses a methodology utilized for predicting the flood wave occurring after the dam break and analyzes the propagation of the flood wave downstream of the dam. Proposed methodology is applied to two dams; Porsuk dam located in Eskişehir and Alibey dam located in Istanbul, Turkey.

Keywords: *Dam break flows, flood wave propagation, HEC-RAS, FLO-2D, Porsuk Dam, Alibey Dam.*

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Investigation of the Dependence of Satellite-Based Precipitation Estimate Errors to Distance from the Coastline[†]

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ABSTRACT

In this study, Tropical Rainfall Measuring Mission (TRMM) 3B42 v7 satellite based rainfall data are verified by using cumulative monthly rainfall data measured at 257 stations operated by the General Directorate of Meteorology between 1998 and 2014. Long-term mean values of station-based and satellite-based rainfall data, correlation between them, Standard deviation of monthly average and anomaly components, and standard deviation of satellite based data error are analyzed. Variation of satellite-based data error with elevation and distance from coasts is the major focus of this study. The results show that, especially the anomaly component of satellite-based rainfall data error is much higher at low-elevation regions and coastal regions compared with high-elevation regions and interior regions.

Keywords: *Remote sensing, station-based precipitation, satellite precipitation error.*

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Experimental Evaluation of the Damage Limit States of R/C Beams[†]

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ABSTRACT

In this study, three cast in situ RC cantilever beams with different shear length / beam effective depth ratios are used for investigating their behavior under displacement controlled cyclic loading simulating earthquakes. Experimentally observed damage states are compared with the respective values proposed by the Turkish Seismic Design Code. It is found that, code based material strain limits remain insufficient to obtain the damage limit state due to buckling of longitudinal steel bars. A new equation for estimating upper strain limits reflecting the contribution of longitudinal bar buckling in compression is derived. The new equation is tested against experimental findings.

Keywords: *Damage limit states, material strain limits, bar buckling, experimental load deflection relationship.*

Developing Damage Estimation Methods for Different Types of Reinforced Concrete Buildings[†]

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ABSTRACT

The main purpose of this study is to develop a damage and loss estimation method for predicting earthquake damage in a possible earthquake. For this purpose; damage probability graphs have been drawn for 11 different types of reinforced concrete structures. In the study, 341 reinforced concrete buildings are grouped according to common features such as number of stories, age of the building, construction quality etc. A total of 11 different building groupings were obtained. All of the buildings are modeled by 3-D computer modeling and each was analyzed by nonlinear pushover analysis. Then, fragility curves for 4 different damage probabilities were plotted for each of the building groups using the data obtained from pushover analysis results. Total of 44 fragility curves were obtained for 11 different building groups. Using the fragility curves obtained by this study, it is possible to estimate the potential damage in any area of the buildings featuring similar characteristics.

Keywords: *Earthquake loss estimation, fragility curves, damage probability, reinforced concrete buildings.*

A Study Depending on the Probabilistic Seismic Hazard Analyses for Design Spectrum Parameters[†]

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ABSTRACT

Within the scope of this study, design spectrum parameters (constant acceleration region, corner periods and site factors) are proposed, depending on probabilistic seismic hazard analyses conducted in a region located in a part of the North Anatolian Fault Zone. The outcomes are obtained for different site conditions and return periods. Two different seismic source models which are area based source, and fault and locational seismic source models are used for probabilistic seismic hazard analyses. The ground-motion characterization is handled by selecting the ground-motion prediction equations that best reflect the seismic excitations around the investigated region. The computation of constant acceleration region corner periods and site factors are based on the empirical relationships that depend on the PGA or spectral accelerations at T = 0.2 s and 1.0 s for rock sites.

Keywords: *Probabilistic seismic hazard analysis, ground-motion prediction equation, design spectrum, control periods, site factors.*

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Stiffness Requirements for Shear Diaphragms Used for Stability Bracing of Slender Steel Beams[†]

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ABSTRACT

The buckling resistance of steel I-beams can be increased by providing lateral bracing along the length of the beams by either cross-frames or diaphragms. Metal sheeting that is often used in steel buildings and bridge constructions to support the fresh concrete, acts like a shear diaphragm and provides continuous bracing to steel beams. An adequate bracing system must possess sufficient stiffness and strength. A computational study was conducted to investigate stiffness requirements of shear diaphragms used to brace slender steel I-beams. Both double and single symmetrical axis sections were studied. Beams that are braced by cross-frames in addition to diaphragms have also been investigated. Stiffness requirements have been proposed for shear diaphragms used to brace slender steel I-beams.

Keywords: *Shear diaphragm, steel beam, continuous bracing, stiffness requirements.*

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A Generalized Finite Difference Method for Plates and Rotational Shells, Using Betti's Theorem[†]

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ABSTRACT

Meshless methods, which have been extensively studied in last decades, are essentially improved forms of the generalized finite difference method. In this paper a generalized finite difference method for thin elastic plates and rotational shells, obtained by using Betti's reciprocal theorem, is presented.

Keywords*: Finite difference method, meshless methods, numerical solution, Betti's theorem.*

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Experimental Investigation of Lateral Load Bearing Capacity of Short Battered Piles[†]

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ABSTRACT

In this study, a short single pile in homogeneous loose sand environment placed vertically and also obliquely that is under the influence of lateral loading, was investigated by small-scale laboratory model tests. The lateral bearing capacity of the short pile was obtained from the experimental study. In addition; the depth of the pivot point, that is expected to occur in the rigid pile was discussed as one of the main parameters affecting the lateral load capacity of the short pile. As a result, the ground soil conditions surrounding the pile, considerably affects the lateral load-bearing capacity of the pile. However, the depth of the rotation point and the lateral load capacity of the short pile placed obliquely in the sand, reveal significant differences as compared to vertical piles.

Keywords: *Short pile, lateral load, battered pile, bearing capacity, pivot point.*