

# **3rd International Conference on Engineering Sciences 2019**

IOP Conference Series: Materials Science and Engineering  
Volume 671

Kerbala, Iraq  
4 - 6 November 2019

Part 1 of 3

ISBN: 978-1-7138-1305-7  
ISSN: 1757-8981

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

This work is licensed under a Creative Commons Attribution 3.0 International Licence.  
Licence details: <http://creativecommons.org/licenses/by/3.0/>.

No changes have been made to the content of these proceedings. There may be changes to pagination and minor adjustments for aesthetics.

Printed with permission by Curran Associates, Inc. (2020)

For permission requests, please contact the Institute of Physics  
at the address below.

Institute of Physics  
Dirac House, Temple Back  
Bristol BS1 6BE UK

Phone: 44 1 17 929 7481  
Fax: 44 1 17 920 0979

[techtracking@iop.org](mailto:techtracking@iop.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

## PART 1

EFFECT OF BRIDGE PIER SHAPE ON DEPTH OF SCOUR.....	1
<i>Halah Kais Jalal, Waqed H. Hassan</i>	
EVALUATION OF RISK FACTORS AFFECTING THE IMPLEMENTATION TIME FOR RESIDENTIAL COMPLEX PROJECTS IN IRAQ .....	16
<i>Tareq A. Khaleel, Mohanad Ahmed Flayeh</i>	
BURNER RIM GEOMETRY EFFECT ON FLAME STABILITY .....	30
<i>Jameel Al-Naffakh, Mohammed Al-Fahham, Qahtan Adnan Abed</i>	
DYNAMIC ANALYSIS OF A ROTATING STEPPED SHAFT WITH AND WITHOUT DEFECTS.....	35
<i>Muhsin. J. Jweeg, Salah. N. Alnomani, Salah. K. Mohammad</i>	
PATH TRACKING AND BACKSTEPPING CONTROL FOR A WHEELED MOBILE ROBOT (WMR) IN A SLIPPING ENVIRONMENT.....	49
<i>Nabil H Hadi, Kawther K Younus</i>	
EVALUATION OF SOLID BIOMASS FUEL FOR SOME IRAQI AGRICULTURAL WASTES USING PROXIMATE AND ULTIMATE ANALYSES .....	66
<i>Mohammed H Alhwayzee, Amer Matrood Imran, Karrar S Nassrullah</i>	
INVESTIGATING NEW THERMAL INSULATORS BASED ON CHEAP NATURAL ORGANIC AND WASTE MATERIALS: PART 1.....	81
<i>Baqer A Alhabeeb, Hayder N Mohammed</i>	
THE PERFORMANCE OF ONE-WAY CLUTCH IN A CAM-BASED INFINITELY VARIABLE TRANSMISSION .....	89
<i>Amjad Al-Hamood, Hazim U Jamali, Oday I Abdullah, J Schlattmann</i>	
OPTIMIZED PATH PLANNING OF AN UNMANNED VEHICLE IN AN UNKNOWN ENVIRONMENT USING THE PSO ALGORITHM.....	103
<i>V Tavoosi, J Marzbanrad, M Golnavaz</i>	
INVESTIGATION OF MATERIAL PROPERTIES EFFECT ON THE OVALIZATION PHENOMENON IN THE TUBE BENDING PRODUCED BY RDB .....	117
<i>Hassan Raheem Hassan, S. M. Abdulgaffar, Kadim Karim Mohsen, Karim Egab</i>	
WEIGHT OPTIMIZATION OF THICK PLATE STRUCTURES USING RADIAL BASIS FUNCTIONS PARAMETERIZATION .....	127
<i>Javad Marzbanrad, Pooya Rostami</i>	
MULTI-RESPONSE OPTIMIZATION OF MECHANICAL PROPERTIES OF AL REINFORCED BY AL <sub>2</sub> O <sub>3</sub> AND/OR SIC USING GREY RELATIONAL ANALYSIS .....	135
<i>Haneen Hameed Hlail, Saad Hameed Al-Shafaie</i>	
SELECTION OF SUITABLE PRECIPITATION CMIP-5 SETS OF GCMS FOR IRAQ USING A SYMMETRICAL UNCERTAINTY FILTER .....	147
<i>Thair S Khayyun, Imzahim A Alwan, Ali M Hayder</i>	

A COMPARATIVE STUDY OF PERFORMANCE OF AL-KHAIRAT GAS TURBINE POWER PLANT FOR DIFFERENT TYPES OF FUEL.....	159
<i>Hayder Jawad Kadhim, Thualfaqr J. Kadhim, Mohammed H Alhwayzee</i>	
EXPERIMENTAL AND NUMERICAL INVESTIGATION OF TEMPERATURE DISTRIBUTION IN THE CUTTING ZONE WITH DIFFERENT COATED TOOLS IN ORTHOGONAL TURNING OPERATIONS.....	170
<i>Basim S. Sahib, Karrar S. Nassrullah</i>	
SIMULATION OF TRIPLEX TUBE THERMAL ENERGY STORAGE SYSTEM USING HIGH TEMPERATURE PHASE CHANGE MATERIAL .....	180
<i>Saeed Ghaffari, Rouhollah Ahmadi</i>	
EXPERIMENTAL STUDY OF A PCM STORAGE SYSTEM INTEGRATED WITH A THERMAL SOLAR COLLECTOR .....	203
<i>A S Shareef, F. N. Al-Mousawi, H. S. Sachit</i>	
IMPROVING COMBUSTION CHAMBER HEAT TRANSFER CORRELATION OF AN HCCI ENGINE IN ORDER TO ACHIEVE A MORE ACCURATE THERMODYNAMIC MODEL .....	215
<i>A Qasemian, M Rezaei</i>	
EXPERIMENTAL AND THEORETICAL INVESTIGATION OF REDUCING ENERGY CONSUMPTION FOR A BUILDING USING GEOTHERMAL WATER THROUGH THE GLASS .....	226
<i>Amer Matrood Imran, Khalid Almusawi, Jaafar Ali Mahdi</i>	
EFFECT OF AXIAL PROFILE MODIFICATION ON THE CHARACTERISTICS OF A FINITE LENGTH MISALIGNED JOURNAL BEARING.....	239
<i>Zahraa A. AL-Dujaili, Hazim U. Jamali, Moneer Al-Saadi</i>	
EXERGY EFFICIENCY FOR RADIATION HEAT TRANSFER .....	257
<i>Hayder Noori Mohammed, M. Pinar Mengüç</i>	
EXPERIMENTAL INVESTIGATION OF HEAT TRANSFER AND FLOW CHARACTERISTICS IN DIFFERENT INLET SUBCOOLED FLOW BOILING IN MICROCHANNEL.....	264
<i>Suha A. Mohammed, Ekhlash M. Fayyadh</i>	
EFFECT OF EMBEDMENT DEPTH FOR CIRCULAR FOOTING ON THE AMPLITUDE OF DISPLACEMENT UNDER DYNAMIC LOAD .....	283
<i>Khalid W. Abdul Kaream, Mohammed Y. Fattah, Zeyad S. M. Khaled</i>	
EXPERIMENTAL STUDY OF HEAT TRANSFER ENHANCEMENT BY INSERTING METAL CHAIN IN HEAT EXCHANGER TUBE.....	298
<i>Ali H. Ghitheeth, Mas Fawzi, Mohammed Wahhab Aljibory</i>	
THE CONTRIBUTION OF CAPACITY CREDIT ON RELIABILITY OF GENERATING SYSTEM ADEQUACY .....	312
<i>Athraa A. Kadhem</i>	
INVESTIGATION OF SILICON NANOWIRES PRODUCED BY METAL-ASSISTED CHEMICAL ETCHING METHOD.....	324
<i>Murtadha A. Alher, Aboozar Mosleh, Seyedeh Fahimeh Banihashemian</i>	
HOT PRESS BONDING OF ALUMINUM ALLOY AA6061-T6 TO POLYAMIDE AND POLYAMIDE COMPOSITES.....	333
<i>Moneer H. Tolephih, Adnan N. Abood, Hussein M. Saad</i>	

ADVANCE ACCEPTANCE STATUS MODEL FOR E-LEARNING BASED ON UNIVERSITY ACADEMICS AND STUDENTS.....	350
<i>Ayad Hameed Mousa, Seham Hameed Mousa, Sundus Hameed Mousa, Hazim Allawi Obaid</i>	
GENETIC ALGORITHM ERROR CRITERIA AS APPLIED TO PID CONTROLLER DC-DC BUCK CONVERTER PARAMETERS: AN INVESTIGATION .....	359
<i>A. A. Chlaihawi</i>	
COGNITIVE NEUROSCIENCE TECHNIQUES IN DETERMINING THE RIGHT TIME OF ADVERTISING .....	369
<i>Akeel A. Alsakaa, Anna Borawska, Mariusz Borawski, Małgorzata Łatuszyńska, Mateusz Piwowarski, Fabio Babiloni, Kesra Nermend</i>	
DISCRIMINATION BETWEEN HEALTHY AND UNHEALTHY MOLE LESIONS USING ARTIFICIAL SWARM INTELLIGENCE .....	378
<i>Mohanad Aljanabi, Jameel Kaduim Abed, H.J. Abd, Ahmed Hussein Duhis, Ammar O. Abdallah, Nadia Alam</i>	
COMPRESSION AND CREEP INDICES OF ORGANIC CLAYEY SOIL .....	391
<i>Mudhafar K. Hameedi, Raid R. Al Omari, Mohammed Y. Fattah</i>	
SPEED CONTROL OF A WHEELCHAIR PROTOTYPE DRIVEN BY A DC MOTOR THROUGH REAL EEG BRAIN SIGNALS .....	404
<i>Bashar Abbas Fadheel, Ali Jafer Mahdi, Hussain Fadhel Jaafar, Muhammad Shahzad Nazir, Muntaha Sattar Obaid, Sarah Hussein Musa</i>	
CALCULATIONS OF LOSS FACTOR BASED ON REAL-TIME DATA: DETERMINING TECHNICAL POWER LOSS FOR THE ELECTRICAL DISTRIBUTION NETWORK IN KARBALA CITY .....	418
<i>Sabah Hassan Alwan, Ali Abdul Razzaq Altahir, Ahmad Salman Al Tu'ma</i>	
A HIGH GAIN MICROSTRIP ANTENNA BASED ON SUBSTRATE INTEGRATED WAVEGUIDE TECHNOLOGY FOR MODERN WIRELESS COMMUNICATION.....	431
<i>Murooj A. Abd Almuhsan, A J Salim, J K Ali</i>	
DC-AC INVERTER WITH TAP CHANGING TRANSFORMER.....	443
<i>Mustafa H Mohsin, Nabil K Al-Shamaa</i>	
THE EFFECT OF MAGNETIC FIELD DIRECTION ON THERMOELECTRIC AND THERMOMAGNETIC COEFFICIENTS OF UNDOPED SINGLE CRYSTALLINE INSB AT ROOM TEMPERATURE.....	452
<i>M Al-Baghdadi, A Kheralla Al-Kadumi, I K Altayyar, K F Anayi, G Min</i>	
CONTROL STRATEGY TO IMPROVE POWER TRANSMISSION CAPACITY FROM WIND FARMS TO WEAK AC GRIDS.....	459
<i>M H Nawir, M M Marei, A S Altuma</i>	
APPLYING A FIREFLY ALGORITHM FOR OPTIMUM ALLOCATION OF SOLAR PHOTOVOLTAIC UNITS IN A DISTRIBUTION SYSTEM .....	473
<i>Ahmed S Tukkee, Mohammed J Alali, Mahmood K Zarkani</i>	
CHARACTERISTICS OF EARTH ELECTRODES UNDER HIGH FREQUENCY CONDITIONS: NUMERICAL MODELLING .....	483
<i>H A Hasan, S M Hameed</i>	

MODELLING OF MOBILE ELECTROMAGNETICS WAVE EFFECTS ON THE HUMAN HEAD.....	492
<i>Husham L. Swadi, Ali A. Abduljabar</i>	
A WRAPPER-BASED FEATURE SELECTION APPROACH FOR ACCURATE FAULT DETECTION OF ROTATING DIODE RECTIFIERS IN BRUSHLESS SYNCHRONOUS GENERATORS.....	499
<i>A Mohammad-Alikhani, A Vahedi, M Rahnama, M H Barzegari Bafghi</i>	
SPATIAL-TEMPORAL ANALYSIS OF LAND USE AND LAND COVER CHANGE DETECTION USING REMOTE SENSING AND GIS TECHNIQUES .....	508
<i>Karar H. Fahad, S. Hussein, Hayder Dibs</i>	
PERFORMANCE EVALUATION OF FLUX-SWITCHING PERMANENT MAGNET WITH MODIFICATIONS TO STATOR AND ROTOR.....	516
<i>Mohammad Hussein Barzegari Bafghi, Abolfazl Vahedi, Arta Mohammad-Alikhani</i>	
A WIRELESS WARNING SYSTEM USING A PROGRAMMABLE INTELLIGENT COMPUTER .....	526
<i>Hameed R Farhan, Haider I Shahadi, Suleiman A Ghazi, Sajjad H Mohsin, Amir H Taherinia</i>	
DESIGN AND IMPLEMENTATION OF A SMART BABY CRIB .....	536
<i>H I Shahadi, D H Muhsen, H T Haider, A H Taherinia</i>	
CROSS DIPOLE ANTENNA BASED GLASS SUBSTRATE FOR AMBIENT ENERGY HARVESTING .....	550
<i>Muayad S Kod, Ali M AlSalim, Hameed R Farhan, Saidatul Izyanie Kamarudin</i>	
ALGORITHM FOR GREENING BIG DATA NETWORKS IN IRAQ UNDER VERACITY DIMENSION.....	556
<i>Howraa M. Mohammad Ali, Muayad Saleem Kod, Ali M. A. Al-Salim, Caesar Al-Amiri</i>	
CONTINUOUS ONLINE TASK PLANNING AND PLAN ACTING IN A DETERMINISTIC ROBOT ENVIRONMENT .....	571
<i>Ahmed A Al-Moadhen, Ali R Khayeat, Maysam J AlMayli</i>	
CHANNEL CROSSTALK IMPACT ON OCDMA PERFORMANCE UNDER EFFICIENT DIAGONAL CODE AND OPTIMIZED PULSE SHAPING.....	583
<i>Yasseen Sadoon Atiya, H. J. Abd, Noora Salim, Norashidah M. Din, Karar Omran</i>	
USING DIFFERENT PROCESSORS AS PREDICTORS TO DETECT A DATA PACKET LOGGING INTO THE SNORT NETWORK WITH MINIMAL DELAY TIME .....	598
<i>Suhad Abbas Yassir, Nahla Flayyih Hasani, Haidar Raad Shakir</i>	
DESIGN OF A LOW NOISE AMPLIFIER FOR L-BAND GPS APPLICATIONS.....	608
<i>Mohammed J Alali, Ahmed S Tukkee, Mahmood K Zarkani</i>	

## PART 2

CONTROL AND TRAFFIC SIGNAL WARRANT ASSESSMENT OF INTERSECTION SITES .....	618
<i>Muneeb Salam Imran, Hussein Ali Ewadh</i>	
DESIGN AND PERFORMANCE ANALYSIS OF A BUS-BAR TRANSMISSION SYSTEM PROTECTION SCHEME USING MATLAB/SIMULINK.....	630
<i>Haider H Jawad, Mohammed S A. Raheem</i>	

A BIOMATERIAL FOR SCAFFOLD APPLICATIONS: THERMAL PROPERTIES ANALYSIS OF A PSZ-TIO <sub>2</sub> /HDPE SYSTEM.....	640
<i>Jenan S. Kashan, Saad M. Ali</i>	
INVESTIGATION OF CHITOSAN FILM DEGRADATION IN TISSUE ENGINEERING APPLICATIONS.....	656
<i>Ishraq A Kadhim, Zuhair J Abdul Ameer, Aseel B Alzubaidi</i>	
A MODIFIED SHANK FOR BELOW KNEE PROSTHESIS .....	664
<i>Mahmud R Ismail, Yassr Y Kahtan, Saif M Abbas</i>	
DESIGN AND MODELING OF A SOFT ARTIFICIAL HEART BY USING THE SOLIDWORKS AND ANSYS .....	673
<i>Saad Mahmood Ali, Zahraa Jasim Ali, Mays Mahde Abd</i>	
BIOMECHANICAL STUDY WITH KINEMATIC AND KINETIC DESCRIPTIONS OF THE EFFECT OF HIGH-HEELED SHOES IN HEALTHY ADULT FEMALES BASED ON GAIT ANALYSIS .....	694
<i>Sadiq J. Hamandi, Duaa M. Ruken</i>	
DESIGN OF AN INTELLIGENT CONTROLLER FOR MYOELECTRIC PROSTHESES BASED ON MULTILAYER PERCEPTRON NEURAL NETWORK .....	709
<i>M N Raheema, J S Hussain, A M Al-Khazzar</i>	
STRESS AND STRAIN ANALYSIS OF A NEW DESIGN OF CERVICAL INTERVERTEBRAL DISC UNDER DAILY ACTIVITY .....	718
<i>Mustafa Asaad, Nabeel Abdul-Sahib, Mahmood Rasheed</i>	
DESIGN OF AN INTELLIGENT CONTROLLER FOR ABOVE KNEE PROSTHESES BASED ON AN ADAPTIVE NEURO-FUZZY INFERENCE SYSTEM .....	730
<i>D A Kadhim, M N Raheema, J S Hussein</i>	
EFFECT OF MUD RHEOLOGY ON CUTTINGS' TRANSPORT IN DRILLING OPERATIONS.....	746
<i>Abdulk. A. Khalil, M. S. Adnan</i>	
ENERGY DISSIPATION IN GABION WEIRS .....	761
<i>A M Al-Fawzy, F M Al-Mohammed, H Alwan</i>	
THE EFFECTS OF CHANGING COIL RADIUS AND TUBE DIAMETER IN THE SIMULATION OF OIL-WATER SEPARATION IN A COIL TUBE SEPARATOR.....	773
<i>S Al-Musawi, M S Adnan, A S Bded, H Jaber, f rashidi</i>	
EFFECT OF FLUIDIZATION ON PRESSURE DROP AND POWER CONSUMPTION IN PACKED BED COLUMNS.....	782
<i>E S Qassem, S H Mohammed, T N Sarmad</i>	
EVALUATION OF THE UPSTREAM SLOPE STABILITY OF EARTH DAMS BASED ON DRAWDOWN CONDITIONS - KHASA CHAI DAM: A CASE STUDY.....	796
<i>Thair J M Alfatlawi, Yahyea K. Al-temimi, Zeena M. Alomari</i>	
EXPERIMENTAL INVESTIGATION: THE OPTIMUM ASPHALT CONTENT AND GRADING FOR PFC MIXTURES USING LOCAL MATERIALS .....	811
<i>Abdul-Kareem N. Abbood, Thair J M Alfatlawi, Safa A. Hussein</i>	
EFFECT OF EARTHQUAKES OVER TIME ON THE GEOGRID-PILE FOUNDATION SYSTEM IN LOOSE SAND .....	822
<i>Athraa A. Al Ghanim, Qassun S. Mohammed Shafiqu, Asma Thamir Ibraheem</i>	

ESTIMATING MUNICIPAL SOLID WASTE GENERATION FROM SERVICE PROCESSIONS DURING THE ASHURA RELIGIOUS EVENT .....	832
<i>M Abdulredha, A Abdulridha, A A Shubbar, R Alkhaddar, P Kot, D Jordan</i>	
THE EFFECTS OF FIBRE ON THE MECHANICAL PROPERTIES OF AERATED CONCRETE.....	841
<i>M R Aldikheeli, M S Shubber</i>	
A STUDY OF THE EFFECT OF LOADED PILE GROUPS ON NEIGHBORING FUEL STORAGE TANKS .....	849
<i>Abdulameer Qasim Hasan, Rafi. M. Qasim</i>	
USING THE LEOPOLD MATRIX PROCEDURE TO ASSESS THE ENVIRONMENTAL IMPACT OF POLLUTION FROM DRINKING WATER PROJECTS IN KARBALA CITY, IRAQ .....	856
<i>F A Al-Nasrawi, S L Kareem, L A Saleh</i>	
FRESH AND HARDENED PROPERTIES OF NANO SELF-COMPACTING CONCRETE WITH MICRO AND NANO SILICA.....	868
<i>Mohammed H. Hameed, Zena K. Abbas, Ali Hussein Ali Al-Ahmed</i>	
IMPACT OF ELEVATED TEMPERATURE ON THE MECHANICAL PROPERTIES OF CEMENT MORTAR REINFORCED WITH ROPE WASTE FIBRES .....	877
<i>Israa Hasan Nayel, Mohammed Salah Nasr, Shereen Qasim Abdulridha</i>	
ASSESSING PROVISIONS IN EUROCODE2 FOR ANCHORING REINFORCING BARS WITH BENDS .....	887
<i>A Ajaam</i>	
REDUCED PERMANENT DEFORMATION OF ASPHALT PAVEMENT BY ENHANCING AGGREGATE GRADATION .....	897
<i>Abdulhaq Hadi Abedali, Yasir Mohammed Jebur</i>	
STRUCTURAL BEHAVIOUR OF SLENDER PVC COMPOSITE COLUMNS FILLED WITH CONCRETE.....	913
<i>Murtaza Allawi Raheemah, Sa'ad Fahad Resan</i>	
NUMERICAL ANALYSIS OF UNDER-REAMED PILE SUBJECTED TO DYNAMIC LOADING IN SANDY SOIL .....	928
<i>M M Jebur, M D Ahmed, M O Karkush</i>	
EFFECT OF PAVEMENT FOUNDATION MATERIALS ON RIGID PAVEMENT RESPONSE .....	939
<i>Alaa M. Shaban, Ahmed Alsabbagh, Salam Wtaife, Nakin Suksawang</i>	
REINFORCING MORTAR WITH SHORT FIBRE IRON WASTE .....	950
<i>Besma M Fahad, Khaled S Jassim</i>	
FRACTURE MECHANISM OF FIBRE REINFORCED CONCRETE PAVEMENT BASED ON A RILEM DESIGN APPROACH.....	959
<i>Salam Wtaife, Ahmed Alsabbagh, Alaa M. Shaban, Nakin Suksawang</i>	
DEVELOPMENT OF OPTIMAL LOCATION AND DESIGN CAPACITY OF WASTEWATER TREATMENT PLANTS FOR URBAN AREAS: A CASE STUDY IN SAMAWAH CITY.....	969
<i>Amjad Hussien, Noorance Al-Mukaram, Ruqayah Mohammed</i>	
EVALUATION OF GRAY WATER TREATMENT WITH PILOT FILTER FOR IRRIGATION PURPOSES .....	981
<i>Batool H. Ibraheem, Musa Habib Alshammari, Husam H. Alwan</i>	



THE EFFECTS ON THE PROPERTIES OF SELF-COMPACTING MORTAR OF USING STAINLESS STEEL BLAST FURNACE SLAG AS A SUSTAINABLE NANO MATERIAL ADDITION .....	991
<i>Ahmed S Kadhim, Alaa A Atiyah, Shakir A Salih</i>	
SPATIAL ANALYSES OF TRAFFIC CONFLICTS TO ASSESS SAFETY AT SIGNALISED INTERSECTIONS .....	1001
<i>Raghad Zeki Abdul Majeed, Hussein A. Ewadh</i>	
EXPERIMENTAL WORK ON IMPROVING THE EFFICIENCY OF STORM NETWORKS USING A NEW GALLEY DESIGN FILTER BUCKET. ....	1014
<i>Karrar A Mohsen, Basim K Nile, Waqed H Hassan</i>	
NON-PARAMETRIC MULTI-CRITERIA OPTIMISATION OF PARK AND RIDE FACILITY LOCATIONS .....	1023
<i>Huda Alghazali, Hussein Attya, Shakir Al-Busaltan</i>	
PREDICTION OF PLYWOOD DEFORMATION UNDER THE IMPACT OF WINDBORNE DEBRIS USING TAGUCHI METHOD.....	1031
<i>O Al-Kubaisi, D Mohotti, O Al-Qassag</i>	
NUMERICAL ANALYSIS OF NONHOMOGENEOUS AND NONPRISMATIC MEMBERS UNDER GENERALISED LOADINGS.....	1039
<i>Adel A Al-Azzawi, Hiba Emad</i>	
DESIGN AND IMPLEMENTATION OF A CONTROL, MONITORING AND SUPERVISION SYSTEM FOR TRAIN MOVEMENT BASED ON FIXED BLOCK SIGNALING SYSTEM WITH AVR MICROPROCESSOR .....	1051
<i>Mohammad Ali Sandidzadeh, Farzaad Soleymaani, Shahrouz Shirazi</i>	
EXPERIMENTAL STUDY ON SHEAR STRENGTH BEHAVIOURS OF THE COMPOSITE UHPC STEEL GIRDERS IN SLENDER WEB.....	1059
<i>Haitham H. Muteb, Dhafer M. Hasan</i>	
ESTIMATING THE VISCOELASTIC PROPERTIES OF LOCAL HOT-MIX ASPHALT .....	1073
<i>Mohammed Z Mohamedmeki</i>	
SCOUR DEPTH AT SINGLE CYLINDRICAL BRIDGE PIERS WITH DEBRIS JAM: AN EXPERIMENTAL COMPARATIVE STUDY.....	1089
<i>Aysar Tuama Al-Awadi, Mahmoud Saleh Al-Khafaji</i>	
INVESTIGATING THE EFFECTIVENESS OF GEOMETRIC AND HUMAN FACTORS ON THE SEVERITY OF URBAN CRASHES .....	1101
<i>Ehsan Ayazi, Ramin Khorsand, Abdolreza Sheikholeslami</i>	
FRESH AND HARDENED PROPERTIES OF SELF-COMPACTING CONCRETE INCORPORATING PVA-TREATED RECYCLED AGGREGATE.....	1109
<i>Doaa H. Aljasimee, M. S. Abo Dhaheer</i>	
TEMPERATURE EFFECTS ON THE FATIGUE LIFE AND TENSILE STRENGTH OF STRUCTURAL ADHESIVES.....	1120
<i>A Al-Mosawe, R Al-Mahaidi</i>	
INFLUENCE OF ANCHORAGE SYSTEMS ON EXTERNALLY-BONDED CFRP SHEETS USED FOR FLEXURAL STRENGTHENING .....	1128
<i>B Al-Atta, R Kalfat, R Al-Mahaidi, A Al-Mosawe</i>	

APPLICATION OF ARTIFICIAL NEURAL NETWORKS IN PREDICTING SUBBASE CBR VALUES USING SOIL INDICES DATA.....	1135
<i>Shakir Al-Busultan, Gafel Kareem Aswed, Raid R. A. Almuhanha, Sajjad E. Rasheed</i>	
IMPROVING ASPHALT BINDER PROPERTIES USING RECYCLED POLYETHYLENE TEREPHTHALATE AND NATURAL LIQUID RUBBER .....	1144
<i>A S Ashour, M M Kareem, Mohammad N Al-Baiati</i>	
A STUDY OF PEDESTRIAN TRAFFIC SAFETY AT THREE-LEG UNSIGNALIZED INTERSECTIONS .....	1157
<i>Sahar S. Neham</i>	
FLEXURAL BEHAVIOURS OF BOX SEGMENTAL BEAMS WITH INTERNAL TENDONS SUBJECTED TO REPEATED AND STATIC LOADS.....	1169
<i>Waleed A. Wrayosh, Ahmed H. Hashim</i>	
DELAY TIME ANALYSIS AND MODELLING OF SIGNALISED INTERSECTIONS USING GLOBAL POSITIONING SYSTEM (GPS) RECEIVERS .....	1185
<i>Z A Alkaissi, R Y Hussain</i>	
MODELLING STILLING BASINS FOR SEWAGE NETWORKS .....	1200
<i>Shahad R. Mohammed, Basim K. Nile, Waqed H. Hassan</i>	
USING INTERNAL FRAMED STEEL STIFFENING RIBS AS AN ALTERNATIVE TECHNIQUE FOR TORSIONAL STRENGTHENING OF RC BOX BEAMS .....	1220
<i>Sabah H. Muhammed, Ali Hameed Aziz</i>	
DEVELOPING A COMPREHENSIVE DIGITAL LIBRARY USING AIRPORT GEOGRAPHIC INFORMATION SYSTEMS (AGIS) .....	1235
<i>Asma Thamir Ibraheem, Waseem Wathiq Hammodat</i>	

### PART 3

INFLUENCE OF CFRP STRENGTHENING ON THE BEHAVIOR OF CONCAVELY-CURVED SOFFIT CONCRETE BRIDGE GIRDERS.....	1259
<i>K Al-Ghrery, R Kalfat, N Oukaili, A Al-Mosawe, R Al-Mahaidi</i>	
REDEFINING THE CONCEPT OF THE 24-HOUR CITY AND CITY NIGHTLIFE FOR HOLY CITIES, WITH THE USE OF ISLAMIC INSTRUCTIONS: A CASE STUDY OF THE HOLY CITY OF KARBALA .....	1267
<i>Ramin Khorsand, Mehran Alalhesabi, Reza Kheyroddin</i>	
EXPERIMENTAL INVESTIGATION OF THE STRUCTURAL BEHAVIOURS OF SELF-COMPACTED REINFORCED CONCRETE HOLLOW BEAMS WITH IN-PLACE CIRCULAR OPENINGS .....	1282
<i>Saif A Hassan, Sadjad A Hemzah, Wajde S Alyhya</i>	
SHRINKAGE AND IMPACT STRENGTH OF FIBRE-REINFORCED ARTIFICIAL LIGHTWEIGHT AGGREGATE CONCRETE .....	1293
<i>Z M Hussein, W I Khalil, H K Ahmed</i>	
EFFECT OF COMPACTION METHODS ON THE MORPHOLOGY OF AGGREGATES IN HOT MIX ASPHALT .....	1303
<i>Mohammed A. Abed, Alaa H. Abed</i>	

LABORATORY STUDY OF LATERAL LOAD CAPACITY AND BEHAVIOUR OF SHORT PILES IN CLAYEY SOIL .....	1318
<i>Hijran Aboud Aljanabi, Jafar Bolouri Bazaz</i>	
TEMPERATURE SUSCEPTIBILITY OF MODIFIED ASPHALT BINDERS .....	1328
<i>Yasameen Hadi Abed, Adabdulhaq H Abedali Al-Haddad</i>	
ASSESSMENT OF THE INFLUENCE OF NANO METAKAOLIN FILLER ON ASPHALT BINDER RHEOLOGICAL PROPERTIES .....	1340
<i>Hussein H. Zghair, Hasan H. Joni, Ali Ahmed Mohammed</i>	
EXPERIMENTAL HYBRID TESTING OF A CONCRETE FILLED STEEL TUBE (CFST) BRIDGE PIER SUBJECTED TO VERTICAL AND HORIZONTAL GROUND MOTIONS .....	1349
<i>Al-Attraqchi Ali, Hashemi Javad, Al-Mahaidi Riadh</i>	
REDUCTION OF POLLUTION CAUSED BY SMOKE FROM BRICK FACTORIES USING A WATER SYSTEM AND REUSE OF WATER FROM BRICK PRODUCTION .....	1356
<i>Mukhtar Dhajir Abbas, Alaa Mahdi Al-Khekany, Labeeb Saadoon Al-Yassri</i>	
FIELD INVESTIGATION ON THE LATERAL RESISTANCE OF RAILWAY TRACKS WITH FRICTIONAL SLEEPERS .....	1364
<i>Jabbar Ali Zakeri, Behrooz Mirfattahi</i>	
A GEOSPATIAL APPROACH TO WALKABILITY QUANTIFICATION: CASE STUDY OF MAIN CAMPUS OF THE UNIVERSITY OF KERBALA.....	1375
<i>Haider I Alyasari, Zaman Auda, Hussein Attya</i>	
STAKEHOLDERS' PERCEPTIONS OF SOCIAL AND ECONOMIC CHALLENGES IN ADOPTING SUSTAINABLE URBAN DEVELOPMENT IN POST-WAR COUNTRIES.....	1380
<i>Raed Fawzi Mohammed Ameen, Haider I Alyasari, Maryam D Altaweel</i>	
ARCHITECTURAL MIMETISM BETWEEN HERITAGE AND TECHNOLOGICAL ADVANCEMENT .....	1390
<i>Waleed S. Alawsey, Hiba A. Al-Dulaimi</i>	
SITE INVESTIGATION OF ALAUQAISER HISTORIC CHURCH USING PHOTOGRAMMETRIC RECONSTRUCTION .....	1402
<i>Haider Naji, Maryam D. Al-Taweel, Anwar Fadhil</i>	
INVESTIGATING THE EFFECT OF POLYPROPYLENE FIBRE ON MORTAR MECHANICAL PROPERTIES WITH THE AID OF MICROWAVE CURING.....	1410
<i>Sara Alaa Abed Alameer, Mohammed Riyadh Mohammed Ali, Ridha Hameed. Majeed, Wajde Shober Alyhya</i>	
PROPERTIES OF ENGINEERED CEMENTITIOUS COMPOSITE CONCRETE (BENDABLE CONCRETE) PRODUCED USING PORTLAND LIMESTONE CEMENT .....	1421
<i>Ikram F Al-Mulla, Ammar S Al-Rihimy, Maitham S Abd Alameer</i>	
THE INFLUENCE OF CURING METHODS ON MARSHALL STABILITY AND FLOW .....	1433
<i>Talal H. Fadhil, Rahel Khalid Ibrahim, Hardi Saadullah Fathullah</i>	
ENHANCING A SOLAR PANEL COOLING SYSTEM USING AN AIR HEAT SINK WITH DIFFERENT FIN CONFIGURATIONS .....	1451
<i>Karim Egab, Abdullah Okab, Hashim S. Dywan, Saad K. Oudah</i>	

A HEAT RECOVERY METHOD OF INTERNAL COMBUSTION ENGINE USING A THERMOELECTRIC GENERATOR .....	1461
<i>Murtdha S. Imran, Hasan.T. Hashim</i>	
A NEW MULTI-OBJECTIVE ALGORITHM FOR UNDERACTUATED ROBOTIC FINGER DURING GRASPING AND PINCHING ASSIGNMENTS .....	1472
<i>Mortada A. Jabbar, Sadeq H. Bakhy, Enass H. Flaieih</i>	
EFFECTS OF HEAT TREATMENT, QUARTZ ADDITIONS AND PARTICLE SIZE ON THE PROPERTIES OF ENAMEL WITH LOW-ALLOY STEEL SUBSTRATE .....	1500
<i>Ibrahim K. Abdulrahman, Ibtihal A. Mahmood, Adnan S. Jabor</i>	
APPLICATION OF A SOLAR CHIMNEY POWER PLANT TO ELECTRICAL GENERATION IN COVERED AGRICULTURAL FIELDS.....	1513
<i>Hasanain A. Abdul Wahhab, Wisam Abed Kattea Al-Maliki</i>	
SIMULATION AND MODELING OF TOWER DIESEL POWER STATION IN SAMAWAH USING FINITE ELEMENT METHOD WITH MATLAB AND COMSOL PROGRAMS.....	1521
<i>Haider Nadhom Azziz, Farhan Lafta Rashid, Hasan Qahtan Hussein</i>	
INVESTIGATION OF ENVIRONMENTALLY-FRIENDLY ALTERNATIVE REFRIGERANTS FOR AUTOMOTIVE AIR CONDITIONING SYSTEMS.....	1540
<i>Mohammed Hasan Abbood, Hasan T Hashim, Amin S Amin</i>	
ANALYTICAL ASSESSMENT OF THE EFFECTS OF BLADE CONE ANGLE ON THE AERODYNAMIC PERFORMANCE OF THE HORIZONTAL AXIS WIND TURBINE .....	1552
<i>Ghanim M. Hachim, Jaafar A. Mahdi</i>	
COMPARABILITY STUDY ON THE EFFECTS OF CURING APPROACHES ON THE MECHANICAL BEHAVIOURS OF REACTIVE POWDER CONCRETE .....	1570
<i>Muntadher J. Taher, Aymen J. Alsaad, Mushtaq Sadiq Radhi</i>	
MICROSTRUCTURE, MECHANICAL AND CORROSION PROPERTIES OF THE 50%NI-47%TI-3%CU SHAPE MEMORY ALLOY .....	1579
<i>Dania Fadhil Abbas, Kadhim Kamil Resan, Ayad M. Takhakh</i>	
IMPROVING THE ELECTRICAL EFFICIENCY OF A PHOTOVOLTAIC/THERMAL PANEL BY USING SIC/WATER NANOFLUID AS COOLANT.....	1589
<i>Mohammed Hasan Abbood, Haroun Shahad, Ali Abdul Kadhum Ali</i>	
NUMERICAL STUDY OF THE BOUNDARY LAYER SEPARATION CONTROL ON THE NACA 0012 AIRFOIL USING TRIANGULAR RIB .....	1607
<i>Mohammed Wahhab Al-Jibory, Hussain Abed Ali Shinan</i>	
STUDY AND OPTIMIZATION OF THE MECHANICAL PROPERTIES OF PVP/PVA POLYMER NANOCOMPOSITE AS A LOW TEMPERATURE ADHESIVE IN NANO-JOINING .....	1624
<i>Ahmed A. Taher, Ayad M Takhakh, Sabah M Thahab</i>	
TOOL PATH GENERATION FOR A CAR REAR DOOR DIE: UMO VERSUS REST MILLING TOOL PATHS.....	1634
<i>Ali K. Alwan, Wissam K. Hamdan</i>	
A CONSECUTIVE HEURISTIC ALGORITHM FOR BALANCING A MIXED - MODEL ASSEMBLY LINE TYPE II USING A (W-TAWH) MODEL DEVELOPED FOR STRAIGHT AND U-SHAPED LAYOUTS .....	1660
<i>Samah A. Aufy, AllaEldin H. Kassam</i>	

EXPERIMENTAL INVESTIGATION OF THE HORIZONTAL DOUBLE PIPE HEAT EXCHANGER UTILIZED PHASE CHANGE MATERIAL.....	1674
<i>Wisam A. Dukhan, Nabeel S. Dhaidan, Tahseen A. Al-Hattab</i>	
THE EFFECT OF TURBULENT FLOW OF FLUID CONTAINING NANO - PARTICLES OF AL <sub>2</sub> O <sub>3</sub> ON FREE VIBRATIONS OF PIPE FOR ELLIPTICAL CROSS SECTION AT DIFFERENT BOUNDARY CONDITIONS.....	1692
<i>N H Al-Raheimy</i>	
WATER SOLAR DISTILLER PRODUCTIVITY ENHANCEMENT USING SOLAR COLLECTOR AND PHASE CHANGE MATERIAL (PCM) .....	1715
<i>Abbas Sahi Shareef, Farhan Lafta Rashid, Hasan Fathi Alwan</i>	
EFFECT OF PROCESS PARAMETERS ON THE SURFACE QUALITY OF MACHINED ALUMINUM AND STEEL PRODUCTS .....	1728
<i>Zaman W. Salman, Adnan A. Uglu</i>	
THE EFFECT OF PRESTRESSING STRANDS ON THE SHEAR BEHAVIOURS OF STEEL BEAMS .....	1742
<i>Mustafa Ahmead Yousif, Kamal Shahada Mahmoud, Ali Farhan Atshan</i>	
INFLUENCE OF SULPHATE AND CHLORIDES ACIDIC MEDIA ON MECHANICAL AND CORROSION BEHAVIOR OF FLY ASH PARTICULATE REINFORCED 2024 AL/TIO <sub>2</sub> COMPOSITES .....	1753
<i>R A Salman, S A Ajeel, N K Zedin</i>	
THE EFFECT OF HEAT TREATMENT CONDITIONS ON THE MECHANICAL BEHAVIOR OF NI-TI SHAPE MEMORY ALLOYS .....	1762
<i>Ali H. Al-Helli, Abdulrahman N. Abed, Asmaa M. Abdullah</i>	
EXPERIMENTAL STUDY OF ATMOSPHERIC WATER COLLECTION POWERED BY SOLAR ENERGY USING THE PELTIER EFFECT.....	1773
<i>Thu'alfaqir J. Kadhim, Abdalrazzaq K. Abbas, Hayder Jawad Kadhim</i>	
INFLUENCE OF REFILL FRICTION STIR SPOT WELDING TECHNIQUE ON THE MECHANICAL PROPERTIES AND MICROSTRUCTURE OF ALUMINUM AA5052 AND AA6061-T3 .....	1783
<i>Akeel Z. Mahdi, Samir A. Amin, Sadeq H. Bakhy</i>	
THEORETICAL ANALYSIS OF THE VIBRATIONS IN GAS TURBINE ROTOR .....	1794
<i>Hussein I. Mansoor, Mohsin Al-Shammari, Amjad Al-Hamood</i>	
APPLYING THE ANALYTICAL HIERARICHY PROCESS AND WEIGHTED SUM MODEL FOR SMALL PROJECT SELECTION IN IRAQ .....	1808
<i>Israa Ibrahim Al-Bayati, Sawsan Sabeeh Al-Zubaidy</i>	
EFFECT OF SIC PARTICLES ON MICROSTRUCTURE AND WEAR BEHAVIOR OF AA6061-T6 ALUMINUM ALLOY SURFACE COMPOSITE FABRICATED BY FRICTION STIR PROCESSING .....	1822
<i>Muna Khethier Abbass, Noor Alhuda Baheer</i>	
NUMERICAL INVESTIGATION OF DRAG REDUCTION TECHNIQUES IN A CAR MODEL .....	1835
<i>Z M Saleh, A H Ali</i>	
STUDY OF THE EFFECTS OF WELDING PROCESS ON THE MICROSTRUCTURE OF WORN CARBON STEEL SHAFT.....	1851
<i>Basim Raheem Sadeq, Basim Salih Sahib, Murtadua Alher</i>	

IMPROVEMENT OF MECHANICAL PROPERTIES OF MAGNESIUM (MG) MATRIX  
COMPOSITES REINFORCED WITH NANO ALUMINA (AL<sub>2</sub>O<sub>3</sub>) PARTICLES..... 1860  
*Hayder Muneam Abed Zaid, Abdul Rahman N. Abed, Hala Salman Hasan*

**Author Index**