

UBSDER CONGRESSES BOOK



IMAEC 4th International Mathematic, Architecture and Engineering Conference



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**IMAEC 4th International Mathematic, Architecture and Engineering
Conference**

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ABOUT CONGRESS

UBSDER 4th CONGRESSES

IMAEC 4th International Mathematic, Architecture and Engineering
Conference

DATE - PLACE

FEBRUARY 26- 27, 2022
IZMIR - TURKEY

ORGANIZATION

UBS International Scientific Research and Strategy Development Association

EVALUATION PROCESS

All applications have undergone a double-blind peer review process.

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PRESENTATION

Oral presentation

LANGUAGES

Turkish, English, Russian

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CONGRESS PROGRAM
Online (with Video Conference) Presentation

Zoom Meeting ID: 842 3828 1623
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ILFEMC CONGRESS

26.02.2022

HALL: 1

SESSION: 1

Meeting ID: 842 3828 1623 Passcode: 260222

10:00 – 12:00 (Turkey Local Time)

MODERATOR: **DR. CÜNEYT MENGÜ**

Authors

Topic Title

DR. CÜNEYT MENGÜ

Tourism in Turkey during the Covid-19 Pandemic

CHEMS EDDINE BOUKHEDIMI

The Evaluation Of Potential Consumer's Attitude Toward Insisting To Buy Organic Food In Algeria

NEVAL KARANFİL

Tüketim Tercihlerinde 'Seçenek Yanılsaması' Üzerine Kuramsal Bir Tartışma

HEZHA HEWA
TAHER SUR

Criminal Protection Objectivity of the Child's Right to Life and Physical and Psychological Safety

ZEHRA FIRAT

Vakıf üniversitelerinde denetim mekanizmasının işleyişi ve etkinliğinin artırılması İçin öneriler

NADİRE KANTARCIOĞLU

Hibrit Çalışma ve Banka Çalışanlarının İş-Yaşam Dengesi

JOANNA K. KONSTANTINOY

Digitization of European SMEs in Tourism and Hospitality: The Case of Greek Hoteliers



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SAULE MUSSABEKOVA	Forensic Medical Capacities of Research of Saliva Stains on Physical Evidence after Washing
ROXAN VENTER	Enforcement of Decisions of Ombudsmen and the South African Public Protector: Muzzling the Watchdogs



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IESBSC CONGRESS

26.02.2022

HALL: 2

SESSION: 1

Meeting ID: 842 3828 1623 Passcode: 260222

10: 00 – 12: 00 (Turkey Local Time)

MODERATOR: **DR. SERKAN GÖKALP**

Authors	Topic title
SEMA GÜLÜNAY DOÇ.DR.FATMA KÖYBAŞI ŞEMİN	Görev Tamamlama Becerisine Sahip Olmayan Okul Öncesi Dönem Çocuklarının Özellikleri Ve Görev Bilinci Kazandırmaya Yönelik Öğretmen Görüşlerinin İncelenmesi
TATIANI D. MOUSOURA	Challenges and Professional Perspectives for Pedagogy Undergraduates with Specific Learning Disability: A Greek Case Study
DR.SERKAN GÖKALP	Ortaokul Öğretmenlerinin Mesleki Dayanıklılık İnanç Düzeyleri İle Öznel İyi Oluşları Arasındaki İlişkinin İncelenmesi
DR.SERKAN GÖKALP	Investigation Of The Relationship Between The Middle School Teachers' Perceptions Of Organizational Trust And Their Innovative Behaviors
SOULICHANH LUANGSOMBATH, THIPPHAVANH KHANTHAPHONE, THIPHACHANH NOUTHAPHONE, BOUNMY PHALYCHAN DAOVY PONGPANYA	Difficulties of Appling English for Communication at Education and Sports Office of Naxaythong District, Vientiane Capital, Laos
HALİL TAŞ	İlkokul Öğrencilerinin E-Okuma Alışkanlıklarının Çeşitli Değişkenler Açısından İncelenmesi



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HUDA S. ALAZMI	Developing an Instrument to Measure Teachers' Self-Efficacy of Teaching Innovation Skills
MUNAZZA A. MIRZA KHAWAR KHURSHID	Impact of VARK Learning Model at Tertiary Level Education
FIKRET CIHAN HATICE AKKOÇ	Meslek Yüksekokulu Öğrencilerinin Ateatiksel Problem Çözme İle İlgili Metaforik Algıları
SIMRAN BALLANI	Etiquette Learning and Public Speaking: Early Etiquette Learning and Its Impact on Higher Education and Working Professionals
RABİA ZAMUR TUNCER	Toplumsal Hafızanın İnşasında Medyanın Sağladığı İmkân Ve Sınırlılıklara Dair Genel Bir Değerlendirme



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IMAEC CONGRESS

26.02.2022

HALL: 1

SESSION: 2

Meeting ID: 842 3828 1623 Passcode : 260222

Authors	Topic title
ÖZGE GÜR SOY PROF.DR.N.FERAH AKINCI	Türkiye’de Konut Kalitesinin İrdelenmesi: İstanbul İmar Yönetmeliği
GAYATRI SUNKAD	The Indian Architecture.- Beautiful Style
RAGHDA SAMİ MAHDİ MEHMET TOLGA SAAD MAHMOOD	Investigation of Self – Compacting Geopolymer Concrete at Elevated Temperature
MİHRİMAH GÖKNAR SENA NUR CAVSAK HAKAN TOZAN MELİS ALMULA KARADAYI	Cold Chain Vehicle Routing Decision Support System
ASPALLELLA A. RAHMAN	Combating Money Laundering in the Banking Industry: Malaysian Experience
ÖĞR. GÖR.EMRE YILMAZ	Düzlemsel Kuvvet Etkisindeki Cam Elyaf Takviyeli Epoksi Matris Kompozit Plakların Farklı Katman Sayılarının Değişimine Etkisinin İncelenmesi
DR. ÖĞR. ÜYESİ LOKMAN BİLEN	Some Harmonic Problems On The Tangent Bundle With Ciconia Metric
DEV DUTT	Self-Tuning Fuzzy Control of Seat Vibrations of Active Quarter Car Model



UBSDER 4th INTERNATIONAL CONGRESSES
FEBRUARY 26-27, 2022
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DR. SEDA CEYLAN	Czts Quantum Dots Loaded Membranes For Tissue Engineering Applications
REZA SEDAGHATI	Providing Additional Advantages for STATCOM in Power Systems by Integration of Energy Storage Device
PANAGIOTIS KYRATISIS KONSTANTINOS KAKOULIS	Simulating Drilling Using a CAD System
BURAK ÇAKIR TALİP FURKAN GÜÇLÜ ARDA UZUN İLYAS ERDUGAN	Dinamik Tork Ölçüm Cihazı Tasarımı poster presentation
FUYANG PENG DONGHONG LI	Design of a Service-Enabled Dependable Integration Environment



UBSDER 4th INTERNATIONAL CONGRESSES
FEBRUARY 26-27, 2022
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IMVHSC CONGRESS

26.02.2022

HALL: 2

SESSION: 2

Meeting ID: 842 3828 1623

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14: 00 – 16:00 (Turkey Local Time)

MODERATOR: **Dr. GÜLTEKİN GÜRÇAY**

Authors

Topic title

SAFFET ALPER ÜNLÜKAL
MUAMMER GÖNCÜOĞLU

Enterobacteriaceae ve Genişlemiş Spektrumlu Beta-Laktamaz (GSBL) Dirençliliği

MOHD FARIDZ AHMAD
MUHAMMAD AMIR ASYRAF ROSLI

Effects of Aerobic Dance on Cardiovascular Level and Body Weight among Women

ASSOC. PROF. FOUZI BOUKHAZANI
DR. KHALIL DJEBARA
DR. HAMMA ROUAIMIA
DR AHMED BABZIZ
PR. FATMA SIAHMED

Ultra-Sound Imaging Of Human Masseter

UZMA AYZ

Genetic Variability, Association And Diversity Study Among The Sunflower Genotypes At Seedling Stage Based On Different Morpho-Physiological Parameters Under Polyethylene Glycol Induced Stress

YASEMİN İSKEFİYELİ
ÖZCAN BUDAK

Sperm Chip Uygulamasının Ve Diğer Sperm Ayrıştırma Yöntemlerinin İvf Başarısı Üzerine Etkilerinin İncelenmesi



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LEBARI B. GBOELOH	Occurrence of Adult Taenia saginata in Cattle Slaughtered in Major Abattoirs in Port Harcourt Metropolis, Nigeria
NAMI MATSUMOTO	Relationship-Centred Care in Cross-Linguistic Medical Encounters
İDİL ŞERBETÇİ SEHER KÜÇÜKERSAN	Ruminantlarda Beslemenin Reprodüksiyon Üzerine Etkileri poster presentation
DR. MÜKREMIN ÖLMEZ, İDİL ŞERBETÇİ	Bıldırcın Diyetlerine Mannan Oligosakkarit Ve Beta-Glukan İlavesinin Büyüme Performansı Üzerine Etkisi
SÜMEYYE YAZICI PINAR SÖKÜLMEZ KAYA	Monosodyum Glutamatın Sağlık Üzerine Etkileri
ÖMER AYIK	Çocuklarda Parmak Ucunun Kapı Arasına Sıkışma Yaralanmaları



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ICCAC CONGRESS

26.02.2022

HALL: 1

SESSION: 2

Meeting ID: 842 3828 1623

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14: 00 – 16: 00 (Turkey Local Time)

MODERATOR: **DR. AMANEH MANAFİDİZAJI**

Authors

Topic title

DR. AMANEH MANAFİDİZAJI

Kelpuregan İlçesinde Geleneksel Çömleklerin Üretimi ve Dekorlama Teknikleri

MARUT PICHETVIT

The Design of Picture Books for Children from Tales of Amphawa Fireflies

YUSUF PARLAK

Takı Sektöründe Kullanılan Yarı Değerli Bir Taş: Sarıkamış Obsidyeni

YUSUF PARLAK

Şam (Damascus) Çeliği ve Türk Burgusu

KHORRAM MANAFİDİZAJI

İran İslam Dönemi Seramik Sanatında Dekor Teknikleri

DIELLA GRACIA MARTAULI

Music Aptitude and School Readiness in Indonesian Children

ABDUL RAHIMAN KANNAM
KULAM

Repercussions of Ritual Dances to Personal Adjustment - A Perspicacious Study among School Children

HAZEM M. EL-BAKRY

Fast Painting With Different Colors Using Cross Correlation In The Frequency Domain

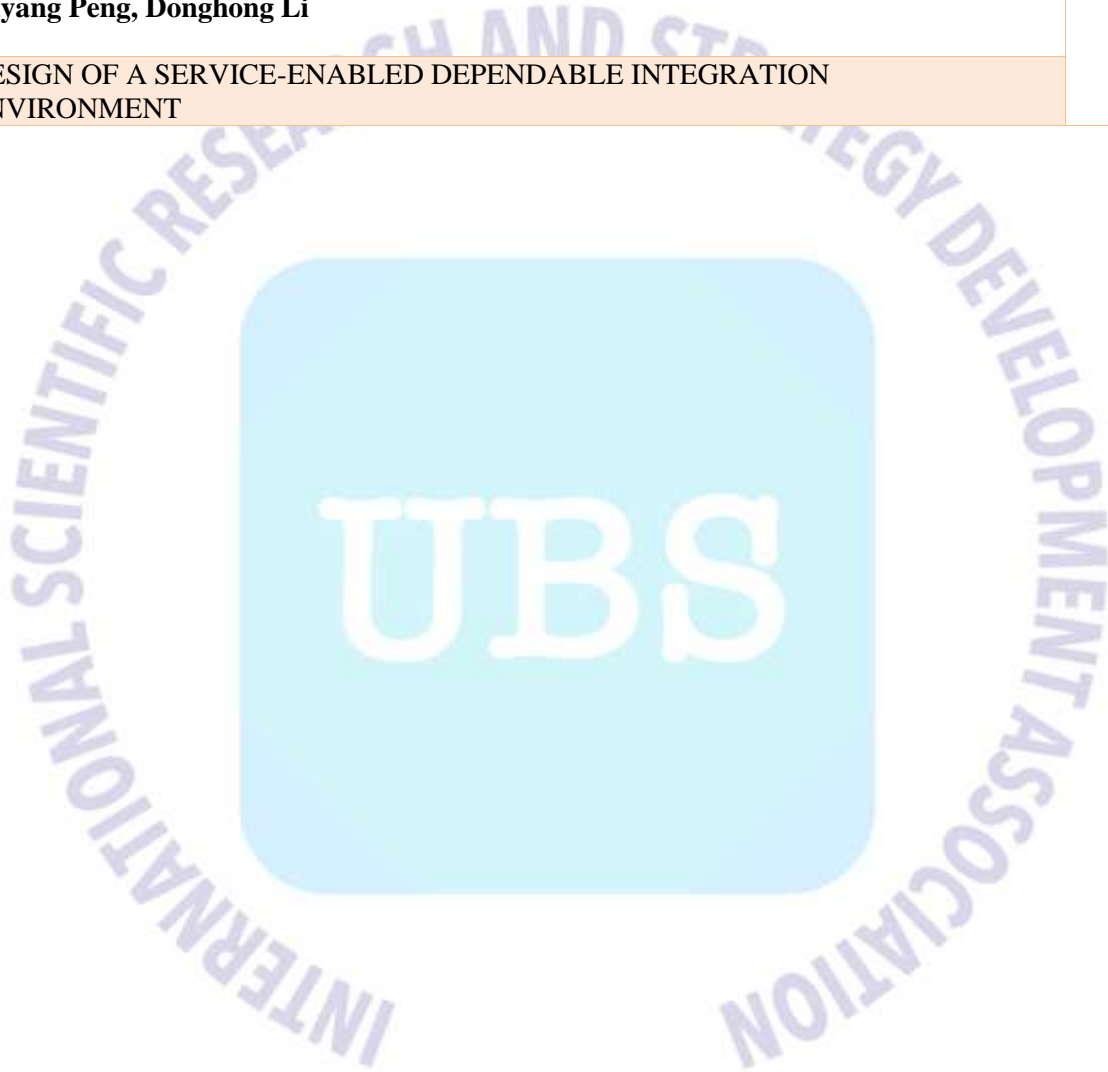


CONTENT

CONGRESS ID	
SCIENTIFIC & REVIEW COMMITTEE	
PROGRAM	
CONTENT	
ORAL PRESENTED PAPERS	
Özge Gürsoy & N. Ferah Akıncı	
TÜRKİYE’DE KONUT KALİTESİNİN İRDELENMESİ: İSTANBUL İMAR YÖNETMELİĞİ	1
Gayatri Sunkad	
THE INDIAN ARCHITECTURE- BEAUTIFUL STYLE.	3
Raghda Sami Mahdi & Mehmet Tolga & Saad Mahmood	
INVESTIGATION OF SELF –COMPACTING GEOPOLYMER CONCRETE AT ELEVATED TEMPERATURE	19
Mihrimah GÖKNAR & Sena Nur CAVSAK & Hakan TOZAN & Melis Almula KARADAYI	
COLD CHAIN VEHICLE ROUTING DECISION SUPPORT SYSTEM	20
Aspalella A. Rahman	
COMBATING MONEY LAUNDERING IN THE BANKING INDUSTRY: MALAYSIAN EXPERIENCE	22
Emre YILMAZ	
DÜZLEMSEL KUVVET ETKİSİNDEKİ CAM ELYAF TAKVİYELİ EPOKSİ MATRİS KOMPOZİT PLAKLARIN FARKLI KATMAN SAYILARININ DEFORMASYON DEĞİŞİMİNE ETKİSİNİN İNCELENMESİ	23
Lokman BİLEN	
SOME HARMONIC PROBLEMS ON THE TANGENT BUNDLE WITH CICONIA METRIC	24
Devdutt	
SELF-TUNING FUZZY CONTROL OF SEAT VIBRATIONS OF ACTIVE QUARTER CAR MODEL	25
Seda CEYLAN	
CZTS QUANTUM DOTS LOADED MEMBRANES FOR TISSUE ENGINEERING APPLICATIONS	26
Reza Sedaghati	
PROVIDING ADDITIONAL ADVANTAGES FOR STATCOM IN POWER SYSTEMS BY INTEGRATION OF ENERGY STORAGE DEVICE	37



Panagiotis Kyratsis & Konstantinos Kakoulis	38
SIMULATING DRILLING USING A CAD SYSTEM	
Burak ÇAKIR & Talip Furkan GÜÇLÜ & İlyas ERDUĞAN & Arda UZUN	39
DİNAMİK TORK ÖLÇÜM CİHAZI TASARIMI	
Fuyang Peng, Donghong Li	51
DESIGN OF A SERVICE-ENABLED DEPENDABLE INTEGRATION ENVIRONMENT	



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TÜRKİYE’DE KONUT KALİTESİNİN İRDELENMESİ: İSTANBUL İMAR YÖNETMELİĞİ

Özge Gürsoy

İstanbul Medeniyet Üniversitesi
– 0000-0002-1020-9479

Prof. Dr. N. Ferah Akıncı

Yıldız Teknik Üniversitesi
- 0000-0002-3628-3132

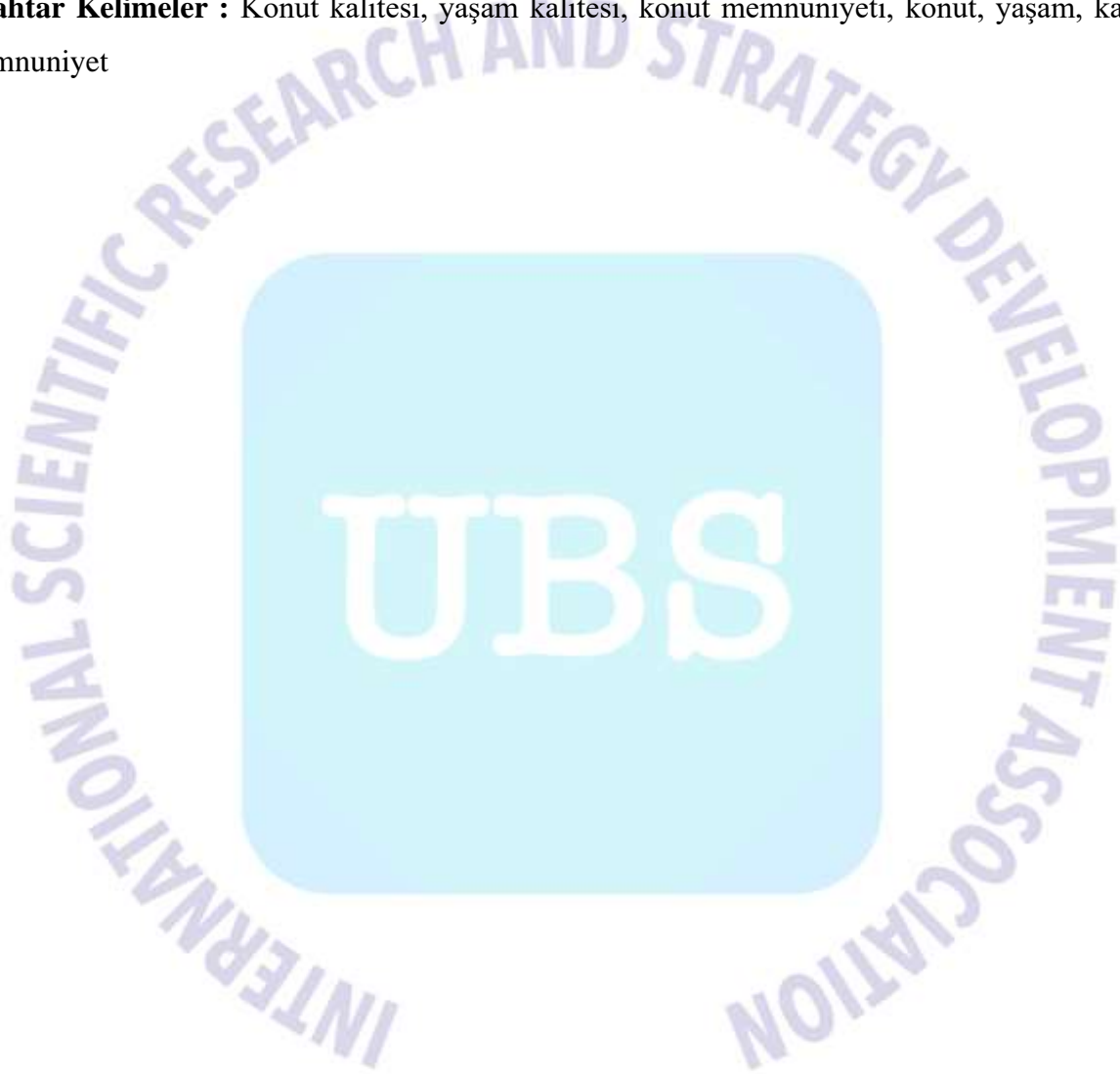
ÖZET

Konut, bireylerin fiziksel ve akıl sağlığını, mutlu, iyi olma halinin ve yaşam kalitesini doğrudan etkilemektedir. Konutların kalitesinin iyileştirilmesi, bireyin yaşam kalitesini de iyileştirmektedir. Kaliteli konut üretiminin sağlanması ve temel standartların uygulanması adına yerel yönetmelikler önemli rol oynamaktadır. Mayıs 2018’de yürürlüğe giren İstanbul İmar Yönetmeliği (İİY), İstanbul için bu rolü üstlenmektedir. Çalışma kapsamında, İİY maddeleri minimum konut kalite standardı oluşturmaları açısından incelenmiştir. Konut tasarımına ilişkin belirtilen sınırlamaların konut kalitesine olan etkisi, literatürdeki konut kalitesi değerlendirme araçları esas alınarak değerlendirilmiştir. İİY, kat yükseklikleri, yapı yerleşimi, yol genişliği gibi sınırlamaların yanında konut birimler için de minimum boyut standartları belirtmektedir. Bu standartlar sadece net alan, boyut ve dar kenar genişliğini ifade etmektedir. Konutun fiziksel koşulları için pencere ve havalandırma kuralları bulunmaktadır. Ayrıca erişilebilirlik açısından asansör ve rampalar için kurallar mevcuttur. Ancak tüm bu kurallar sağlanması gereken bir koşuldan öteye geçip kalite standardı açısından değerlendirilebilecek seviyede değildir. Hane halkı sayısı ile eşya yerleşimi, minimum oda boyutları için hesaba katılması gereken faktörlerdir. Konutun fiziksel koşulları, yaşam konforunu doğrudan etkilemektedir. Dolayısıyla sadece pencerenin ya da ışıklığın varlığı kuralı yetersiz kalmaktadır. Oda boyutları, yönlenme, çevresel gürültü, ısı ve ses yalıtımı ile birlikte bütüncül bir kaliteli fiziksel koşul standardı oluşturulmalıdır. Değerlendirme sonucu yönetmeliğin minimum konut kalitesi standardı oluşturma da yetersiz kaldığı görülmektedir.



Yönetmeliğin sadece boyut standartları sağlamak yerine bireylerin ihtiyacını ve kalite gereksinimlerini karşılayacak şekilde düzenlenmesi gerekmektedir. Bu sayede hem toplumun yaşam kalitesi artarak halk sağlığı ve refahı olumlu yönde gelişecektir.

Anahtar Kelimeler : Konut kalitesi, yaşam kalitesi, konut memnuniyeti, konut, yaşam, kalite, memnuniyet



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**THE INDIAN ARCHITECTURE- BEAUTIFUL STYLE.****Post Graduate, Gayatri Sunkad,**

Department of Political Science

Independent Researcher,

Abstract

The Indian architecture has unique compared to the architecture in the world. Different styles as well as experiments done in architecture by our ancient kings are more relevant in today also.

The Indian architecture is much old to even Roman style of architecture also. The temples, kalyana mantapa constructed by our ancient kings are still the centre of attraction also. The temples which were constructed in the point of view of religious programmes are the experiments in the field of architecture also. Our architects created the different styles of our gods and goddess are explains the story about Ramayana and Mahabharata also.

Our Indian style of architecture can be classified as northern style, southern style, Nagara style, Indo- saranic style etc. Each style of architecture is having different style with beautiful style of decorations also.

Introduction;-Like art, science, technology, painting, our Indians are contributed in the architecture also. Our Indian style of architecture is mostly available in the rock carved caves as well as different styles of dancing girls, the stories of Ramayana and Mahabharata also.

The famous rulers like Vijayanagara rulers, Chalukyas of Badami, Mughal rulers were having their different style of architecture which is fully reflected in our temples also. The famous sun temples in Konark, Khujarah, Taj Mahal, and Gol Gumbaz are the best examples of architecture and still attract the foreign travelers also.

Key points;- Ancient, style, architecture, curved temples, rock, religious etc.

Methodology;

Our history creates a great impact on shaping our future. The ancient technologies adopted by our very own ancestors is extremely iconic. During the early times, there was an ecological balance maintained amongst the human and natural environment. They believed in amalgamating the nature with the building to create a picturesque scenario so did not harm the natural beauty of the environment. India at present boasts about 3650 approximately renowned ancient heritage structures and sites of national importance. Highlighted here is a regional study of the ancient construction techniques of Bengal and its undiscovered historical beauty.



India has been recognized worldwide for its variant culture and its contribution to the same. If each and every heritage structure are taken in account, a common factor that seems to be distinctive is its construction technique and structural stability which ensures its existence even till date in spite of witnessing calamities, manmade disasters and negligence. This promotes and renders to the rich cultural heritage of our country. Divided into its various architectural types and styles, each and every structure has its own individuality and speciality. Not sure if it is the contribution of the English or our very own Aryan ancestors in the field of architecture, these places do come up with innumerable unique techniques which are still being discovered. While some structures are under the protection of World Heritage Commission, Archaeological Survey of India or State Heritage Commission, there is also a shocking existence of more than 1 lakh structures, precincts and sites which are still unidentified and unprotected. Highlighting a particular region and its architectural style which was known for its simplicity and grandeur using locally available material.

Case Study:-

One of the greatest discovery of humankind, which was previously unidentified in the land of West Bengal, India is Moyna Garh in Purba Medinipur district. The entire fort is encircled with two concentric wide moats with huge mounds stretching up to 13 acres. The only way to reach the fort is by boat. The first moat is at a distance of 200 metres from the second. Engrossed in lush concentric greenery, the fort creates a picturesque environment. With time and development, there is an existence of a single moat now. Presently, Moyna Garh belongs to West Bengal Heritage Commission.

Satellite Image Of Moyena Garh Palace In 2014 And 2015, West Bengal

Another finest example that can be mentioned is the Mahisadal Rajbari which is also in Purba Medinipur district built by the Garg family in the 18th Century. The unique fort stands alone as one of the greatest examples of the building construction techniques amalgamating both European and Bengal architectural styles and methods of construction. The gigantic Nava-Ratna temple of 35 feet height, within the vicinity, is a marvellous construction technique.

Art and Architecture:- India is famous for art and architecture. The temples like Ajanta, Yellora, Hampi, Belur, and Halebid are some of the temples of gracious art and architecture.

Architecture at the time of Mauryas:- The contribution of the Maurya's art and architecture is of great significance . Magasthanese's Indica records the grandevour of Maurya's palace in Pataliputra. The wooden ruins of the palace and the fort around the palace in Pataliputra have been found during the excavation. During the period of Ashoka, many ‘‘ Stupas’’ were built and ‘‘ pillars’’ were erected..

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Architecture at the time of Guptas; The Iron pillar at Mehauri in Delhi near Qutb Minar is important. It is 23 feet and eight inches in height and weights 6,000Kg. It is one of the finest examples of the technical skill of the time. It has not become rusty till now. That shows in those days Indians had a sound Iron technology.



Kumara Cave

Architecture at the time of Shatavahanas; The Ajanta and the Amravati paintings were created during the period of the Shatavahanas. Temples, Viharas, and the Chaityalayas were also constructed. A Chaityalaya was built in Karle by the Banavasi merchant Bhootapala.



Architecture at the time of Kadambas; The Kadambas laid the foundation for architecture in Karnataka. They built many temples and Basadis in Banavasi. During this period, educational centres like agraharas, Brahmapuris and ghatikas were established. The main agraharas of that time were found in Talagunda, and Balligave. The agraharas were like residential schools.



Architecture at the time of Gangas;- The Gangas further, installed, a 58 foot monolithic idol of Gommateshwara at Shravanabelagola, and made it a famous centre.

The Maha Mastakabhisheka of Gommateshwara which takes place once in every 12 years even to this day.

The Ganga kings encouraged art and architecture. They built beautiful temples and Basadis. The Kapileshwara temple at Manne, Pataleshwara and Maruleshwara temples at Talakad. Kolaramma temple at Kolar, Nagareshwara temples at Begur and the statue of Gommateshwara at Shrivabelagola are examples of their architecture. The significant contribution of the Gangas has been the tall pillars called Manastambhas.



Contribution of the Chalukyas of Badami to the field of architecture;- The Chalukyas of Badami were great builders as well as art lovers. They built beautiful temples at Badami, Aihole, and Pattadakallu. They developed a special style architecture called as ‘The Chalukya style’ in Indian architecture. They built cave temples in the rocks of Badami.



The best examples in the Chalukyas style are in Aihole and Pattadakallu. Aihole was one of the cradles of temple architecture. Evolution of the series of temples architecture was first experimented here. This style found its full expression at Pattadakallu. Thus we see the famous temples Lokeshwara and Trikoreshwara here. We get conclusive proof of the Chalukyas artistic achievement in the towering sculptures of Vishnu, Varaha, Harihara and Aedhanarishwara in the caves of Badami.



Virupaksha Temple

The contribution of the Pallavas to the field of architecture;- The Pallavas were lovers of art and architecture. They built many temples in their kingdom, which are noteworthy for their artistic skill. The Pallava architecture can be classified into temples that have been carved out of stone, and temples with structural pattern.

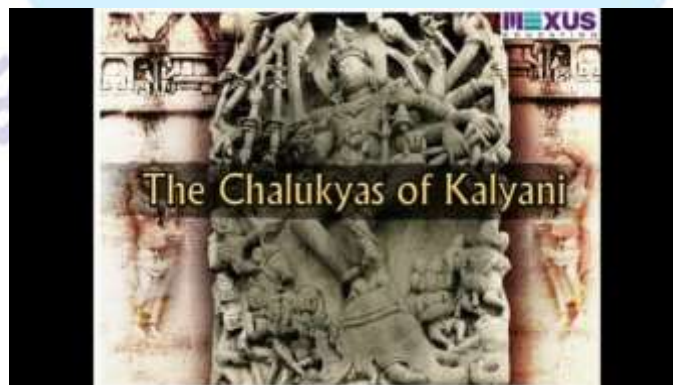
Many temples carved in rocks can be seen in Mahabalipuram. Wonderful monolithic sculptures have been carved in these temples. They tell the stories from Mahabharata and Bhagavata. The Panchataantras are the famous monolithic temples. The carving of ‘Arjuna’s Meditation’ has emerged as an excellent work of art.



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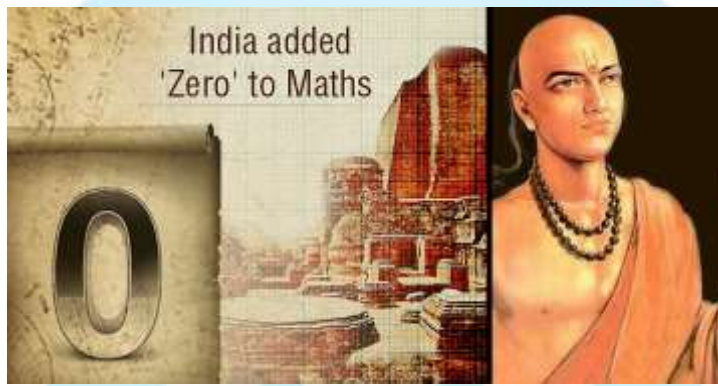
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During this period, temples, palaces, efforts, towers, huge halls, public buildings, tanks, bunds, canals, and dams were constructed.

The unique features of Vijayanagar art;- The Vijayanagar kings continued the architectural style of Chalukyas, Cholas, and Hoysalas. The unique feature of their architecture was the construction of huge auditoriums and marriage halls. Temples had huge towers, leaf shaped arches and platforms. In this art, more than ornamentation, the qualities of grandeur, awe, and elegance were given importance. Rough granite stone was used for construction of these structures.

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Architecture at the time of Mauryas; The contribution of the Maurya's art and architecture is of great significance. Magasthanese's Indica records the grandeur of Maurya's palace in Pataliputra. The wooden ruins of the palace and the fort around the palace in Pataliputra have been found during the excavation. During the period of Ashoka, many "Stupas" were built and "pillars" were erected..



Architecture at the time of Guptas; The Iron pillar at Meerut in Delhi near Qutb Minar is important. It is 23 feet and eight inches in height and weighs 6,000Kg. It is one of the finest examples of the technical skill of the time. It has not become rusty till now. That shows in those days Indians had a sound Iron technology.



Kumara Cave

Architecture at the time of Shatavahanas:- The Ajanta and the Amravati paintings were created during the period of the Shatavahanas. Temples, Viharas, and the Chaityalayas were also constructed. A Chaityalaya was built in Karle by the Banavasi merchant Bhootapala.



Architecture at the time of Kadambas:- The Kadambas laid the foundation for architecture in Karnataka. They built many temples and Basadis in Banavasi. During this period, educational centres like agraharas, Brahmapuris and ghatikas were established. The main agraharas of that time were found in Talagunda, and Balligave. The agraharas were like residential schools.



Architecture during Kadamba Dynasty

Architecture at the time of Gangas:- The Gangas further, installed, a 58 foot monolithic idol of Gommateshwara at Shravanabelagola, and made it a famous centre.

The Maha Mastakabhisheka of Gommateshwara which takes place once in every 12 years even to this day.

The Ganga kings encouraged art and architecture. They built beautiful temples and Basadis. The Kapileshwara temple at Manne, Pataleshwara and Maruleshwara temples at Talakad. Kolaramma temple at Kolar, Nagareshwara temples at Begur and the statue of Gommateshwara at Shravabelagola are examples of their architecture. The significant contribution of the Gangas has been the tall pillars called Manastambhas.



Contribution of the Chalukyas of Badami to the field of architecture:- The Chalukyas of Badami were great builders as well as art lovers. They built beautiful temples at Badami, Aihole, and Pattadakallu. They developed a special style architecture called as ‘The Chalukya style’ in Indian architecture. They built cave temples in the rocks of Badami.



The best examples in the Chalukyas style are in Aihole and Pattadakallu. Aihole was one of the cradles of temple architecture. Evolution of the series of temples architecture was first experimented here. This style found its full expression at Pattadakallu. Thus we see the famous temples Lokeshwara and Trikoteshwara here. We get conclusive proof of the Chalukyas artistic achievement in the towering sculptures of Vishnu, Varaha, Harihara and Aedhanarishwara in the caves of Badami.

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Virupaksha Temple

v

The contribution of the Pallavas to the field of architecture;- The Pallavas were lovers of art and architecture. They built many temples in their kingdom, which are noteworthy for their artistic skill. The Pallava architecture can be classified into temples that have been carved out of stone, and temples with structural pattern.

Many temples carved in rocks can be seen in Mahabalipuram. Wonderful monolithic sculptures have been carved in these temples. They tell the stories from Mahabharata and Bhagavata. The Panchataantras are the famous monolithic temples. The carving of ‘‘ Arjuna’s Meditation’’ has emerged as an excellent work of art.

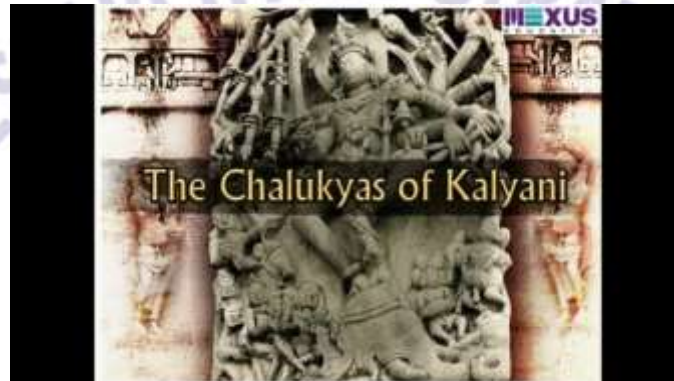


iv

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Shri Vadiraja of Sode who was well versed in 64 art know the best designs of architecture and encouraged the Indian architecturists.

Conclusion:- Totally we can say that , the Indian style of architecture is very special due to its decorative art. The Indian style of architecture is still studied by the many students who are interested in making experiments in architecture.

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INVESTIGATION OF SELF –COMPACTING GEOPOLYMER CONCRETE AT ELEVATED TEMPERATURE

Raghda Sami Mahdi

^a Department of Civil Engineering, Gaziantep University, Gaziantep, Turkey

Corresponding Author

Mehmet Tolga

^b Department of Civil Engineering, Gaziantep University, Gaziantep, Turkey

Saad Mahmood

^c Department of Civil Engineering, Tikrit University, Tikrit, Iraq

Abstract

This research investigates the effect of high temperature on self-compacted geopolymer concrete (SGPC) that is prepared by using fly ash (FA) as binder material with sodium hydroxide (NaOH) and sodium silicate (Na_2SiO_3) as the alkaline activator. On the other hand, this research is study the effect of different molar concentrations of NaOH (12M,14M,16M) on fresh characteristics, mechanical properties, and fire resistance of SGPC. So, in this study three mixes were designed and cured a room temperature. The SGPC specimens were exposed to five levels of temperature (room temperature, 200 °C, 400 °C, 600 °C, and 800 °C) for 1.5 hours, after 28 days of curing at room temperature. Mechanical properties of SGPC were investigated such as compressive strength, modulus of rupture, and split tensile strength. Fresh properties of SGPC were Also investigated such as slump test, L-box test, V- funnel test. the results are found that the increase of the molarity has an adverse effect on the fresh properties of the SGPC. While the mechanical properties of the SGPC are enhanced by increasing the molarity. Additionally, all mixes are showed good fire resistance. But , the mix with 16 M is showed better fire endurance. Where the increase in the molarity increases the fire resistance of SGPC.

Keywords: Self -Compacted Geopolymer Concrete. Elevated Temperatures, Mechanical Properties, fresh properties.



COLD CHAIN VEHICLE ROUTING DECISION SUPPORT SYSTEM

Mihrimah GÖKNAR

İstanbul Medipol Üniversitesi

– ORCID ID: 0000-0002-8406-3513

Sena Nur CAVSAK

İstanbul Medipol Üniversitesi

– ORCID ID: 0000-0003-0265-5601

Hakan TOZAN

İstanbul Medipol Üniversitesi

– ORCID ID: 0000-0002-0479-6937

Melis Almula KARADAYI

İstanbul Medipol Üniversitesi

ORCID ID: 0000-0002-6959-9168

ABSTRACT

In the past, during the logistics of perishable products, there were great losses in these products since the thermal properties of products were not considered and logistics planning was not made properly. Especially during the pandemic process, the importance of food supply has emerged, and this kind of food is now mostly transported in the cold chain. In this study, we present an approach for Machine Learning (ML) guided Cluster First Route Second (CFRS) to solve multi-depot capacitated vehicle routing problem (MDCVRP) for the logistic of the refrigerated vehicles. Our approach for MDCVRP is firstly classifying the customers' demand types and these types are determined according to the temperature specifications of the refrigerated vehicle. After that, for each class of customers classification with K-means is employed according to the coordinates of customers in the class. Finally, routing is done with a specially designed model with Google OR (Operations Research) tool. The routing results showed that there is an improvement in the total routing distance with the ML guided CFRS. In the last step of the study, the routing system will be designed as a decision support system. Through this application, it is aimed to ensure that this



study will be a step and infrastructure for future studies in order to ensure effective use of resources in the logistics sector.

Keywords : Vehicle Routing Problem, Machine Learning, Cold Chain, Refrigerated Vehicles



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COMBATING MONEY LAUNDERING IN THE BANKING INDUSTRY: MALAYSIAN EXPERIENCE

Dr. Aspalella A. Rahman

Senior Lecturer at the School of Law,
Government and International Studies University Utara Malaysia

Abstract:

Money laundering has been described by many as the lifeblood of crime and is a major threat to the economic and social well-being of societies. It has been recognized that the banking system has long been the central element of money laundering. This is in part due to the complexity and confidentiality of the banking system itself. It is generally accepted that effective anti-money laundering (AML) measures adopted by banks will make it tougher for criminals to get their "dirty money" into the financial system. In fact, for law enforcement agencies, banks are considered to be an important source of valuable information for the detection of money laundering. However, from the banks- perspective, the main reason for their existence is to make as much profits as possible. Hence their cultural and commercial interests are totally distinct from that of the law enforcement authorities. Undoubtedly, AML laws create a major dilemma for banks as they produce a significant shift in the way banks interact with their customers. Furthermore, the implementation of the laws not only creates significant compliance problems for banks, but also has the potential to adversely affect the operations of banks. As such, it is legitimate to ask whether these laws are effective in preventing money launderers from using banks, or whether they simply put an unreasonable burden on banks and their customers. This paper attempts to address these issues and analyze them against the background of the Malaysian AML laws. It must be said that effective coordination between AML regulator and the banking industry is vital to minimize problems faced by the banks and thereby to ensure effective implementation of the laws in combating money laundering.

Keywords: Banking Industry, Bank Negara Money, Laundering, Malaysia.

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DÜZLEMSEL KUVVET ETKİSİNDEKİ CAM ELYAF TAKVİYELİ EPOKSİ MATRİS KOMPOZİT PLAKLARIN FARKLI KATMAN SAYILARININ DEFORMASYON DEĞİŞİMİNE ETKİSİNİN İNCELENMESİ

Emre YILMAZ

İstanbul Aydın Üniversitesi

– 0000-0001-5209-0368

ÖZET

İhtiyaç unsurlarına yönelik gerçekleştirilen bir tasarımın somut hale dönüştürülmesinde ilgili tasarımın ihtiyaç ilkelerini optimal düzeyde karşılayacak malzeme türünün seçilmesi gerekmektedir. Bu malzeme seçiminin en ideal seviyede uygun kapasiteyi içerecek şekilde yapılması hem güvenilirliğin sağlanması hem de maliyet analizi açısından önemli bir noktadır. Son yıllarda gelişen teknoloji ile birlikte tek tip malzemelerin yerini kompozit malzemeler olarak adlandırılan en az iki farklı malzemedan oluşan yeni bir malzeme türü almıştır. Kompozit malzemeler başta otomotiv ve uçak sanayi olmak üzere tüm sektörlerde kullanılmaktadır. Tek tip malzemelerle karşılaştırıldığında, kompozit malzemeler tek başına yüksek özgül mukavemet, yüksek korozyon direnci, yüksek yorulma direnci ve yüksek aşınma direnci özellikleri sağlar. Kuvvet etkisi altındaki herhangi bir tasarımda deformasyonun meydana gelmesi o tasarımın ilgili kuvvet için güvenilir olmadığı açıktır. Malzeme tipi seçimi ile birlikte malzeme boyutlarının doğru belirlenmesi deformasyon güvenliği açısından önemlidir. Cam elyaf kompozit malzemeler üstün özelliklerinden dolayı otomotiv sanayi, uzay sanayi, savunma sanayi gibi alanlarda kullanılmaktadır. Bu çalışmada, sonlu elemanlar yöntemine dayalı bilgisayar programı simülasyonu ile kuvvet ve plaka boyutları sabit alınarak, cam elyaf epoksi matrisli kompozit malzeme plakalarının düzlemsel kuvvet etkisi altında farklı katman sayıları için deformasyon analizleri yapılmıştır. Cam elyaf ve epoksi malzemeler ayrı ayrı farklı katman sayılarında uygulanmış, farklı katman sayıları için; sabit düzlemsel kuvvet altında kompozit plakanın deformasyon değişimleri tablo ve grafiklerde incelenmiş ve katman sayısının cam elyaf epoksi matrisli kompozit plakanın deformasyonu üzerindeki etkileri belirlenmiştir.

Anahtar Kelimeler : Cam elyaf kompozit malzeme, Kompozit plak, Deformasyon analizi, Kompozit malzeme katman sayısı, Düzlemsel kuvvet.



SOME HARMONIC PROBLEMS ON THE TANGENT BUNDLE WITH CICONIA METRIC

Lokman BİLEN

Iğdır Üniversitesi

ORCID ID: 0000-0001-8240-5359

ABSTRACT

Let (M_{2k}, J, g) be an almost anti-paraHermitian manifold and (TM, \tilde{g}) be its tangent bundle with a Ciconia metric \tilde{g} . In this paper, we deal with harmonicity of the canonical projection $\pi: (TM, \tilde{g}) \rightarrow (M_{2k}, J, g)$ which is a Riemannian submersion. The harmonicity of the ξ vector field, which is considered as a map $\xi: M \rightarrow TM$, is studied. After that, we investigate the harmonicity of Ciconia metric \tilde{g} and Sasaki metric Sg with respect to each other.

Finally, we study the conditions for the vanishing of the second fundamental form of the identity map between (TM, \tilde{g}) and $(TM, \tilde{g}^{\tilde{\nabla}})$, where $\tilde{g}^{\tilde{\nabla}}$ is the mean connection of the Schouten-Van Kampen connection associated with the Levi-Civita connection of the Ciconia metric.

Anahtar Kelimeler : Ciconia metric, harmonic map, Riemannian metrics.

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SELF-TUNING FUZZY CONTROL OF SEAT VIBRATIONS OF ACTIVE QUARTER CAR MODEL

Assoc. Prof. DR. Devdutt

Manav Rachna International University, Faridabad, Haryana, India

Abstract:

An active quarter car model with three degrees of freedom is presented for vibration reduction of passenger seat. The designed Fuzzy Logic Controller (FLC) and Self-Tuning Fuzzy Logic Controller (STFLC) are applied in seat suspension. Vibration control performance of active and passive quarter car systems are determined using simulation work. Simulation results in terms of passenger seat acceleration and displacement responses are compared for controlled and uncontrolled cases. Simulation results showed the improved results of both FLC and STFLC controllers in improving passenger ride comfort compared to uncontrolled case. Furthermore, the best performance in simulation studies is achieved by STFLC controlled suspension system compared to FLC controlled and uncontrolled cases.

Keywords: Active suspension system, quarter car model, passenger ride comfort, self-tuning fuzzy logic controller.

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CZTS QUANTUM DOTS LOADED MEMBRANES FOR TISSUE ENGINEERING APPLICATIONS

Seda CEYLAN¹

¹Department of Bioengineering, Faculty of Engineering, Adana Alparslan Türkeş Science and Technology University, Adana, Turkey, 0000-0002-1088-7886

ABSTRACT

In order to prevent infections on the wound, this project was based on to develop PVA/chitosan-based wound dressing scaffolds with anti-infective ability by using $\text{Cu}_2\text{ZnSnS}_4$ quantum dots (CZTS QDs). CZTS nanoparticles were produced in quantum dot form by a simple hydrothermal process and characterization properties of CZTS QDs were reported. The chemical structure, contact angle and mechanical properties of membranes were analyzed. Antimicrobial activity and cell viability of membranes were also investigated. 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide assay was used to investigate the cytocompatibility of the membranes. These overall results presented that CZTS QDs incorporated membranes could have potentially appealing applications as antimicrobial scaffolds for wound healing applications.

Keywords: $\text{Cu}_2\text{ZnSnS}_4$ quantum dots, CZTS, Chitosan, PVA.

1. INTRODUCTION

$\text{Cu}_2\text{ZnSnS}_4$ (CZTS) are nanoparticles that have excellent properties such as direct band gap ($E_g \sim 1.4-1.6$ eV), high absorption coefficient ($>10^4$ cm^{-1}) in the visible region, low toxicity, good photostability, high carrier mobility, heat resistance, and long diffusion lengths [1–7]. Although they contain components that are very sensitive to microorganisms and have low toxic effects, such as much inorganic metal and metal oxide nanoparticles (NPs), which are frequently used in antibacterial applications, few studies report the examining of antibacterial, antimicrobial, and cytotoxic activities of CZTS NPs [8–12].

The antibacterial activity of tubular micron CZTS particles against some bacterial pathogens (*S. Haemolyticus*, *S. Aureus*, *A. Hydrophila*, *A. Salmonocida masoucida*, *E. coli*) was studied [13]. It has been shown to exhibit superior antibacterial activity compared to 30-50 nm Ag-NPs and ampicillin. Even at a concentration of 0.5 mg ml^{-1} , CZTS particles have been demonstrated to be a practical antimicrobial agent.

Although a few articles related to CZTS nanoparticles for biological applications, to the best of our knowledge, no research paper has yet been published on PVA/chitosan (P/C) membranes containing CZTS QDs. In this study, high mobility CZTS NPs were produced in quantum dot form by a simple hydrothermal process and loaded to P/C membranes. The chemical structure of the nanoparticles was analyzed. In addition to this, the effect of CZTS QDs amount on the characteristics properties of P/C scaffolds was analyzed. Moreover, membranes' chemical, mechanical properties, as well as hydrophilicity properties were studied. Antibacterial response and cytocompatibility of membranes were also analyzed and reported. CZTS QDs positively affected the characteristic properties of produced P/C membranes without the crosslinking agent in terms of mechanical and antimicrobial aspects compared with pure P/C membranes. Ultimately, this work provides the first demonstration of CZTS QDs loaded membrane design for wound dressing applications.

2. MATERIALS AND METHODS

2.1. Materials

Polyvinyl alcohol (PVA; 99% hydrolysed and Mn: 89,000-98,000 g mol⁻¹), glycerol (C₃H₈O₃; ≥99.0%, for molecular biology), acetic acid (CH₃COOH; ≥99%), chitosan (C₅₆H₁₀₃N₉O₃₉; medium molecular weight), tin(IV) chloride (SnCl₄; 99.995%), ethanol (C₂H₅OH; absolute) were purchased from Sigma Aldrich (Germany). Copper(II) acetate monohydrate (C₄H₈CuO₅; 99.9%), zinc acetate dehydrate (C₄H₁₀O₆Zn; 98.0%), thiourea (NH₂CSNH₂; 99%), oleylamine (C₁₈H₃₇N; ≥98%) were obtained from Alfa Easer by Thermo Fisher Scientific.

Staphylococcus aureus american type culture collection (ATCC) 29213, *Escherichia coli* ATCC 25922 and *Candida albicans* ATCC 90028 strains were used in antimicrobial activity experiments and the strains were stored in brain-heart infusion broth (Merck, Germany) with 10% glycerine at -80°C. The strains were also used in the quality control of antimicrobial activity experiments. Bacteria were grown on Mueller-Hinton agar (MHA) (Merck, Germany) and *Candida albicans* strain was grown on Sabouraud dextrose agar (SDA) (Oxoid) for 24 h at 35° for further experiments.

All cell culture media, supplements, and markers were obtained from Gibco (Tulsa, OK, USA). MTT Assay Kit (cat no: ab211091 Abcam, UK). Cell culture studies were performed in a Thermo MSC Advantage 1.2 laminar airflow cabinet. An Olympus Japan inverted light microscope was used for counting cells. Scanning Electron Microscope (SEM, Thermo Scientific Apreo S, Matal Ege University).

2.2. Synthesis of CZTS QDs

CZTS QDs were prepared based on a previously reported synthesis technique [14]. Copper(II) acetate monohydrate (0.1 mmol), zinc acetate dehydrate (0.05 mmol), tin(IV) chloride (0.05 mmol) and oleylamine (1 mmol) were completely dissolved in 80 mL of ethanol. Then, thiourea (0.2 mmol) was added to the solution. After being kept in a nitrogen environment for 15 minutes, it was transferred to autoclave and heated at 180 °C for 16 hours. The product was washed by

centrifugation at 7000 rpm for 10 min with ethanol. The collected precipitate was dried at 60 °C for 24 hours.

2.3. Preparation of P/C and P/C-QDs membrane scaffolds

P/C and P/C-QDs membranes were obtained by solvent casting technique with some modifications to the methods reported in previous studies[15]. PVA solution (5%, w/v) was prepared by dissolving the calculated amount of PVA in distilled water at 90 °C. On the other hand, chitosan solution (1%, w/v) was obtained using acetic acid solution (3%, v/v) under a magnetic stirrer for 5 hours. The polymer solutions were then mixed in a 1:1 volume ratio so that the final polymer solution volume was 2 ml. Then, 10 µl of glycerol and different concentrations of CZTS QDs (1.6, 2.5, and 3.3%, w/w) were added to the 2 ml of P/C solution as listed in Table 1. CZTS QDs concentrations are given according to their ratio to the total amount of polymer in the solutions. The P/C-QDs mixture was stirred on a magnetic stirrer for 18 hours, then poured into polytetrafluoroethylene PTFE molds and incubated at 40 °C for 24 hours. Fig. 1 presents a schematic view of the manufacturing steps of the membrane scaffolds.

Table 1. Compositions of ingredients of polymer solution with the ratio of CZTS QDs.

Sample name	PVA, % (w/v)	Chitosan, % (w/v)	CZTS QDs, % (w/w)
P/C	83	17	0
P/C-QDs (0.5)	83	17	1.6
P/C-QDs (1.0)	83	17	2.5
P/C-QDs (2.0)	83	17	3.3

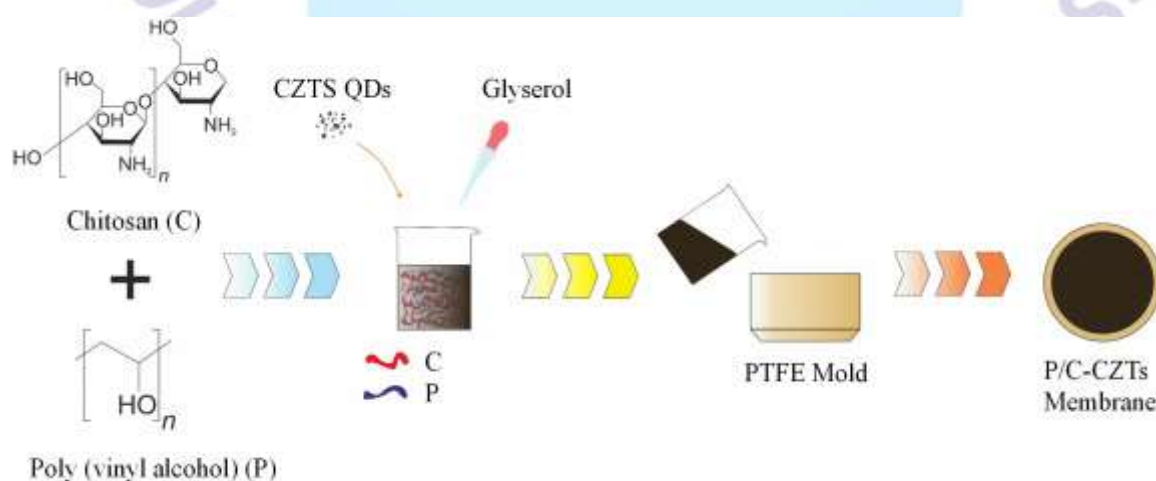


Figure 1. Schematic overview of the production steps of P/C and P/C-QDs scaffold membranes.

2.4. Characterization studies of CZTS QDs

The morphology of the synthesized CZTS QDs was investigated by TEM measurements (Hitachi HighTech HT7700). The chemical phase structure of CZTS QDs was investigated by X-Ray

Diffraction (XRD) device (Bruker Axs D8 Advance) using nickel filtered Cu-K α radiation in the 2 θ range from 20° to 80°. The absorbance spectra of CZTS QDs were recorded by using a UV–Vis spectrophotometer (Thermo Scientific Genesys 150).

2.5.Characterization studies of membrane scaffolds

Fourier-transform infrared spectroscopy (FTIR, Perkin Elmer, FTIR/FIR/NIR Spectrometer Frontier-ATR, USA) was used to analyze the functional groups and chemical interactions between PVA, chitosan, and CZTS QDs. The spectra were obtained in the range of wavenumber from 4000 to 650 cm⁻¹ with a resolution of 4 cm⁻¹.

The contact angles (θ) of membranes were measured using the optical subsystem (Attension, Biolin Scientific, Sweden) with image-analyzing software via a sessile drop measurement. The measurements were performed at room temperature at five independent points and presented as mean with standard deviation (SD). Images were captured at the end of the 5 s after contact of a water droplet with the membrane by a camera levelled with the surface.

The tensile properties of membranes were analyzed using the texture analyzer, Stable MicroSystems (model TA.XTPlus, Surrey-England). The membranes were cut (40 × 10 mm) and the crosshead speed was set at 1 mm s⁻¹ (load cell of 5 kg) under dry conditions. The initial distance between the grips was adjusted 30 mm. Elongation at break (%), tensile strength (MPa), young modulus (MPa) were presented with three replicates.

2.6.Cytotoxicity studies

Cytocompatibility of nanocomposite scaffolds was also investigated. The cell line was cultured with Dulbecco's modified Eagle's medium (DMEM, Lonza, Belgium) supplemented with 10% fetal bovine serum (FBS, Lonza) and 1% L-glutamine, 1% sodium pyruvate, essential amino acids and 1% penicillin-streptomycin in a humidified incubator at 37 °C where the CO₂ level is kept constant at 5%.

Evaluation of cytotoxicity of P/C and CZTS QDs loaded nanocomposite were conducted by using L929 mouse fibroblast cell line. Cell viability and proliferation were investigated by 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide, (MTT) assay via quantitatively analysing the number of viable cells, which is based on the reduction of a yellow tetrazolium salt or MTT to purple formazan crystals by metabolically active cells. The viable cells contain NAD(P)H-dependent oxidoreductase enzymes which reduce the MTT to formazan.

Before the direct assay, membranes were prepared at the same shape/volume (r = 1.1 cm). Three samples as experimental (cell and membrane) were placed in a well plate and 15 × 10³ cells were seeded onto the surface of the membranes. Meanwhile, as the control group (only cells), cells were drop-seeded into the 24- well flat culture plate at the same density per well. After cell seeding, the cell-seeded samples were incubated at 37 °C for 2 h to allow cells to adhere to the membrane before adding culture medium. After 2 h of incubation, the culture medium was added and the cells

on the membranes were then cultured for selected times (24, 48, and 72 h). At the end of the incubation process, cell viabilities were examined by MTT protocol.

3. RESULTS AND DISCUSSION

3.1. Characterization results of the synthesized CZTS QDs

The morphological structure and size of the synthesized CZTS QDs were analyzed by TEM microscopy. The obtained TEM image and the size distribution plot of CZTS QDs were presented in Figures 2A and B, respectively. Results showed that the particles had uniformity and were well dispersed, and the mean particle size was 5.24 ± 0.61 nm with a distribution between 4-6 nm.

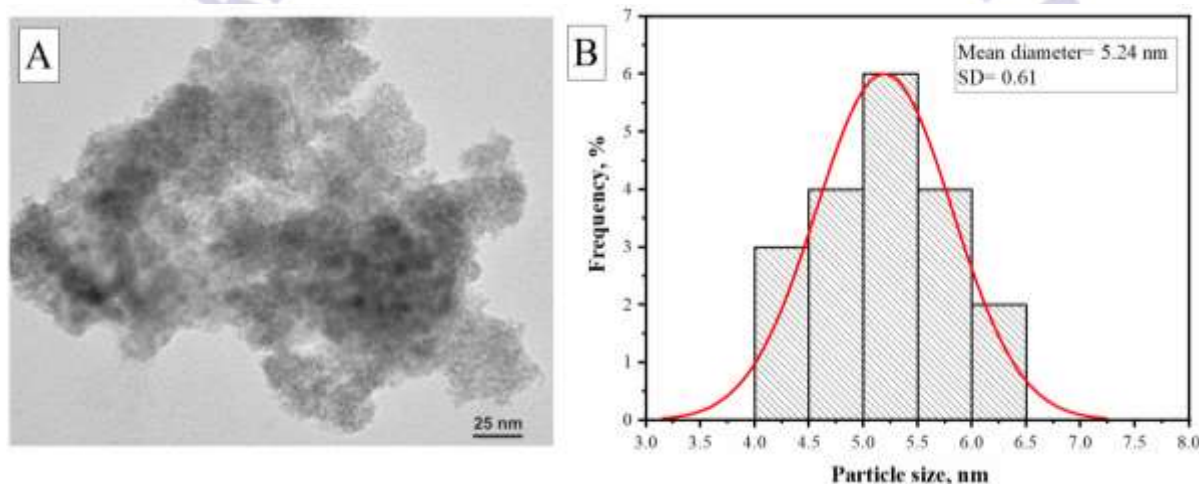


Figure 2. A) TEM image and B) the particle size distribution curve of CZTS QDs.

The CZTS QDs were then analyzed to determine their physicochemical properties using XRD, FTIR and UV measurements. The XRD patterns of CZTS QDs are shown in Figure 3A. The diffraction peaks at 28.5 , 47.3 , and 56.1° correspond to planes (112), (220), and (312) of the kesterite CZTS (JCPDS No. 26-0575) [16].

The structural formation of CZTS QDs nanoparticles has been confirmed by the FTIR spectra as shown in Figure 3B. The spectrum shows dominant peaks at 520 , 1054 , 1393 , 1992 , 2115 , 2328 , 2901 , 2987 and 3666 cm^{-1} . The peak observed around 3666 cm^{-1} is usually caused by the S=H thiol functional class of thiourea ($\text{CH}_4\text{N}_2\text{S}$), stretching vibration of -OH from the presence of water (H_2O) or characteristic absorption of symmetrical and asymmetrical -NH stretching vibration bands [17]. The band at around 2987 cm^{-1} indicates the presence of an amine group. The peak at around 2901 cm^{-1} is due to -C=CH- stretching mode [18]. The other peaks located between 520 and 1992 cm^{-1} are attributed to metal-thiourea intermediate complexes.

The UV-visible absorption spectra of CZTS QDs dispersed in ethanol were obtained by UV-Vis spectrometry, as shown in Figure 3C. The absorption spectrum of CZTS QDs is similar to the CZTS QD or nanocrystals obtained by hot injection, hydrothermal method, two-phase method and it is a broad trace curved towards the long wavelength direction [19,20]. In order to determine the

bandgap energy of CZTS QD, from the spectrum using a Tauc plot for direct band gap semiconductors. The bandgap of synthesized CZTS QDs particles is 1.5 eV. The obtained data is in good agreement with the literature for CZTS particles [21,22].

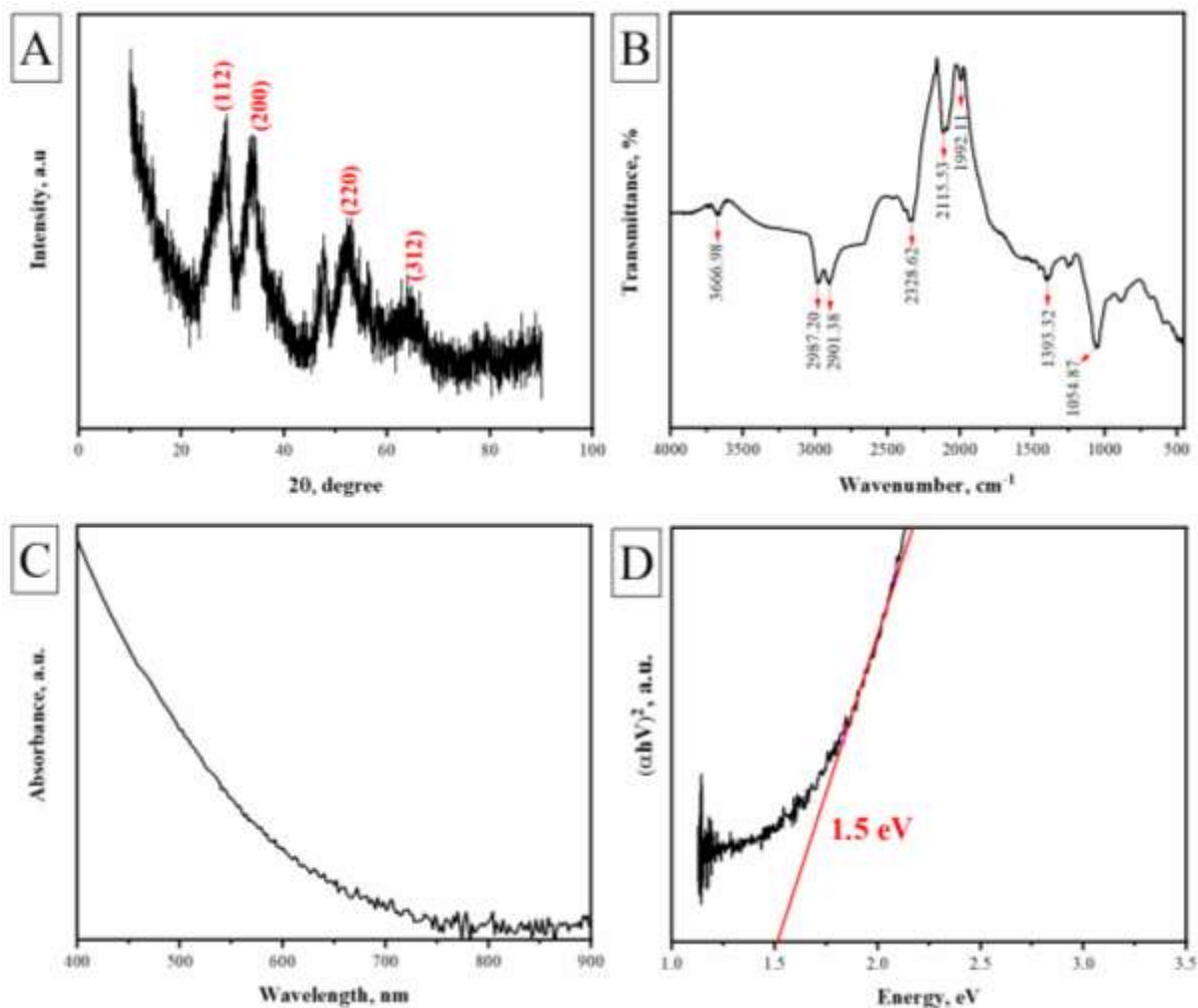


Figure 3. A) XRD pattern, B) FTIR spectrum, C) UV spectrum and D) band gap energy plot of CZTS QDs.

3.2. Characterization results of the membrane scaffolds

3.2.1. Chemical structure

FTIR spectra of P/C and CZTS QDs loaded membranes are shown in Fig. 4A. The colour of the membrane turns dark brown as the rate of CZTS QD increases because of the dark brown colour of the CZTS QDs (Fig. 4B).

The characteristic peaks from pristine chitosan and PVA can be observed in Fig. 4A. For the pure chitosan, the peak at 1650.95 cm^{-1} was because of the C=O stretching (amide I), the peaks at 1095.49 cm^{-1} and 1033.77 cm^{-1} show the C=O stretching [15]. In addition to these, the spectrums present the characteristic absorption peaks at about 3270 cm^{-1} (–OH stretching band), 2900 cm^{-1}

($-\text{CH}_2-$ asymmetric and the symmetric stretching), and 1340 cm^{-1} (O=H and C=H bonding) because of the PVA. The peaks observed at 1113 cm^{-1} are associated with the C=O vibration. The C=O stretching band of chitosan amide I at 1645 cm^{-1} disappeared after increasing CZTS QDs amount in the presence of PVA due to the formation of intra and intermolecular bonds between them. Changes in peaks were observed in P/C membranes compared with CZTS QDs loaded nanocomposite membranes indicated that loading to PVA and chitosan membranes using solvent casting technique was achieved successfully.

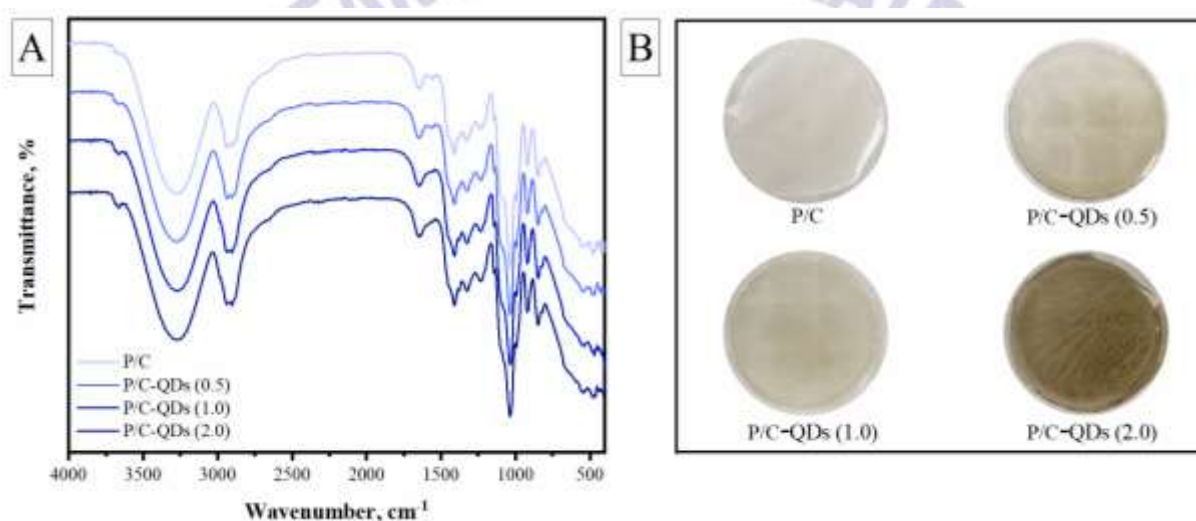


Figure 4. A) FTIR spectrum and B) Photographs of plain P/C membrane and different amounts of CZTS QDs added P/C membranes.

3.2.2. Cell viability

L929 cells were cultured on membranes for 24, 48 and 72 h, and proliferation ability was tested with MTT assay. Two dimensional (without membrane) cell cultures were used as control. The data in Figure 5 shows that P/C and P/C-QDs membranes had extremely little toxicity to the growth of L929 cells on different days. Results of the MTT assay in Figure 5 showed that cells cultured on P/C-QDs (2.0) membrane had a higher proliferation rate than the control group at 24 and 48h. On the 72 h, the cell viability of P/C-QDs (2.0) was relatively low and this situation may be explained by the limiting area of the membrane surface.

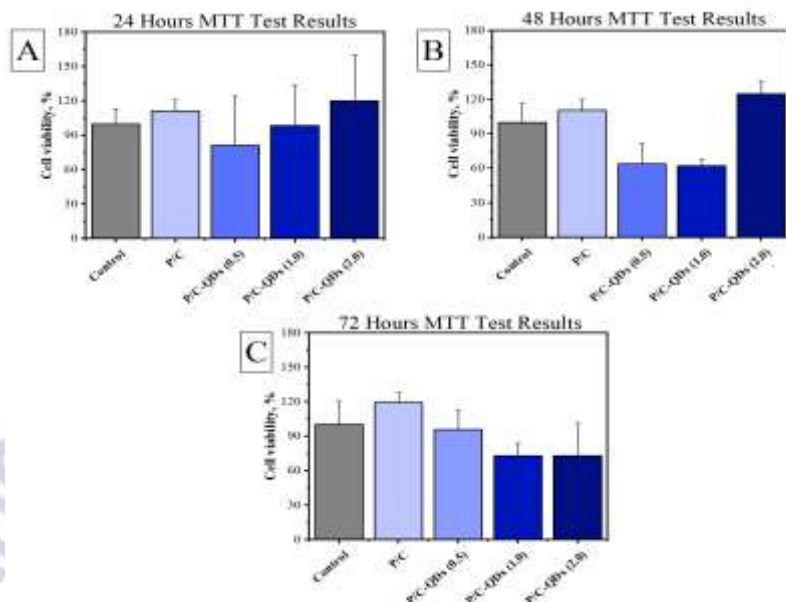


Figure 5. Measurement of cell viability after A) 24, B) 48 and C) 72 h incubation with increasing concentrations of CZTS QDs.

3.2.3. Antimicrobial activity

In this context, the agar diffusion method was used and the obtained inhibition zone diameter results were summarized in Table 2. Only the P/C-QDs (2.0) inhibited the growth of the Gram-positive and Gram-negative bacteria strains. P/C-QDs (2.0) scaffold showed strong antibacterial activity against *S. aureus* and *E. coli*, which are the most common organisms causing wound infections for use as an antibacterial material in wound dressing. For this reason, the study continued with the P/C-QDs (2.0) membrane scaffold and in vitro biocompatibility studies of this sample were carried out.

Table 2. Mean inhibition zone diameters of membrane scaffolds

Samples	Mean diameter (mm)		
	<i>S. aureus</i>	<i>E. coli</i>	<i>C. albicans</i>
P/C	-	-	-
P/C-QDs (0.5)	-	-	-
P/C-QDs (1.0)	-	-	-
P/C-QDs (2.0)	11.00±0.00	11.00±0.00	-

(-): no inhibition zone



4. Conclusion

In this study, we successfully prepared CZTS QDs, CZTS QDs loaded PVA/chitosan membranes by solvent casting method. The XRD, FTIR and UV measurements pattern of quantum dot nanoparticles affirmed the formation of CZTS QDs. In the second step, different amounts of CZTS QDs were added to the membrane process and characterization properties of these membranes were reported for wound dressing applications. Mechanical properties and contact angle measurements showed that CZTS QDs amount affects the P/C membrane. Compared with plain P/C membrane, the contact angle of CZTS QDs added membrane is decreasing with CZTS QDs particle concentration. Furthermore, the fabricated P/C-QDs (2.0) nanocomposite polymeric scaffolds have exhibited antibacterial activity against *S. aureus* and *E. coli*. In addition to this, all membranes were analyzed for cytocompatibility studies with L929 cells and the results were compared with literature researches. These membranes were non-toxic to these cells. Finally, this P/C-QDs (2.0) membrane, because of the presence of CZTS QDs, has good potential for wound dressing applications, in particular for the prevention of infections on the wound.

Declarations

Funding: Not applicable

Conflicts of interest: The authors confirm that no conflict of interest occurred in this study.

Availability of data and material: This article has no additional data.

Code availability: Not applicable

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PROVIDING ADDITIONAL ADVANTAGES FOR STATCOM IN POWER SYSTEMS BY INTEGRATION OF ENERGY STORAGE DEVICE

Reza Sedaghati

Beyza Branch, Islamic Azad University, Beyza, Iran.

Abstract:

The use of Flexible AC Transmission System (FACTS) devices in a power system can potentially overcome limitations of the present mechanically controlled transmission system. Also, the advance of technology makes possible to include new energy storage devices in the electrical power system. The integration of Superconducting Magnetic Energy Storage (SMES) into Static Synchronous Compensator (STATCOM) can lead to increase their flexibility in improvement of power system dynamic behaviour by exchanging both active and reactive powers with power grids. This paper describes structure and behaviour of SMES, specifications and performance principles of the STATCOM/SMES compensator. Moreover, the benefits and effectiveness of integrated SMES with STATCOM in power systems is presented. Also, the performance of the STATCOM/SMES compensator is evaluated using an IEEE 3-bus system through the dynamic simulation by PSCAD/EMTDC software.

Keywords: STATCOM/SMES compensator, chopper, converter, energy storage system, power systems.

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SIMULATING DRILLING USING A CAD SYSTEM

Panagiotis Kyratsis

Technological Education Institution of Western Macedonia, Kila Kozani - Greece

Konstantinos Kakoulis

Technological Education Institution of Western Macedonia, Kila Kozani - Greece

Abstract:

Nowadays, the rapid development of CAD systems' programming environments results in the creation of multiple downstream applications, which are developed and becoming increasingly available. CAD based manufacturing simulations is gradually following the same trend. Drilling is the most popular holmaking process used in a variety of industries. A specially built piece of software that deals with the drilling kinematics is presented. The cutting forces are calculated based on the tool geometry, the cutting conditions and the tool/work-piece materials. The results are verified by experimental work. Finally, the response surface methodology (RSM) is applied and mathematical models of the total thrust force and the thrust force developed because of the main cutting edges are proposed.

Keywords: Application programming interface, CAD, drilling, response surface methodology, RSM.

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DİNAMİK TORK ÖLÇÜM CİHAZI TASARIMI

Burak ÇAKIR¹, Talip Furkan GÜÇLÜ², İlyas ERDUĞAN³, Arda UZUN⁴

¹ Sakarya Uygulamalı Bilimler Üniversitesi, Teknoloji Fakültesi, 0000-0002-9529-0666

² Sakarya Uygulamalı Bilimler Üniversitesi, Teknoloji Fakültesi, 0000-0001-7674-635X

³ Sakarya Uygulamalı Bilimler Üniversitesi, Teknoloji Fakültesi, 0000-0002-5999-9088

⁴ Sakarya Uygulamalı Bilimler Üniversitesi, Teknoloji Fakültesi, 0000-0002-7624-8374

ÖZET

Tork, kuvvetin itme veya döndürme etkisi olarak tanımlanabilir. Bu değerin ölçülmesi, başta makine, otomotiv, inşaat, savunma sanyii olmak üzere birçok sektör ve çalışma için büyük önem arz etmektedir. Tork ölçümü statik ve dinamik tork ölçümü olarak iki başlık altında incelenir. Bu çalışmada ele alınan dinamik tork ölçümü için ise bir çok yöntem mevcuttur. Bunların başlıcaları, motorların elektriksel davranışını inceleyerek akım-tork ilişkisinden tork değerinin elde edilmesi ve yüzey gerinim/akustik dalga sensörleri kullanarak, çalışan mil üzerinde oluşan sinyalleri alıp işleyerek tork değerinin elde edilmesidir.

Bu çalışmadaki dinamik tork ölçüm cihazı tasarımında ise, çalışan mil üzerindeki burulma değerini encoder sensörler ile ölçüp bu değerden tork değerine ulaşma yöntemine başvurulmuştur. Tasarlanan ürünün hassasiyeti her iki yönde 15 Nm belirlenmiş ve bu yük altında 4 derece kayma almak hedeflenmiştir. Bu hedef doğrultusunda öncelikle analiz ve tasarım çalışmaları yapılarak, istenilen kayma değerini verecek ve burulmayı arttırarak ölçümü kolaylaştıracak özel bir mil tasarlanmış ve üzerinde teorik deneyler yapılmıştır. Tasarlanan bu mile uygun encoder, kabuk , yardımcı mil elemanları gibi diğer cihaz elemanları da tasarlanıp montaj ve çalışma similasyonu yapılmıştır.

Anahtar kelimeler: Tork Ölçümü, Dinamik Tork Ölçümü, Encoder ile Tork Ölçümü

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GİRİŞ

Tork ölçümünü iki ana kategoriye ayırabiliriz bunlar: statik ve dinamik tork ölçümü. Statik tork ölçümü , tam bir çalışma olmayan , milin bir uçtan sabitlendiği , diğer ucundan da burulmaya maruz kaldığı ve uygulanan momentin de sabit olduğu durumdur. Dinamik tork ölçümü ise, tam

çalışma gösterin bir sistem üzerinde ,anlık olarak uygulanan momentin değişebildiği tork ölçüm durumudur. [1]

Günümüzde, dinamik tork ölçüm cihazları otomotiv endüstrisi, hava yolları, gemicilik ve tıp gibi alanlar başta olmak üzere bir çok alanda kullanılmaktadır. Dinamik tork ölçümüne, tasarlanan sistemlerde anlık olarak tork değerini görerek güvenlik sınırlarının aşılmadığından emin olmak ve sistemin çalışmasından bir çıktı almak amacıyla başvurulabilir. [2].

Dinamik tork ölçümü temel olarak mil üzerindeki yüzey gerilmelerinin ölçülmesi ile hesaplanır. Bunun en yaygın yöntemi yüzeye yerleştirilen yüzey gerilim sensörleridir. Mile uygulanan yük sonucu oluşan sinyali yakalayan bu sensörler, elektronik sinyal işleme kartıyla veya herhangi bir bağlantı olmadan kablosuz iletişim modülüyle sinyali iletirler. Bu projede ise mil üzerinde oluşan burulmayı özel mil tasarımıyla arttırıp, milin her iki ucundaki burulma farkını encoder sistemi ile yakalayıp, bu farktan tork değerine ulaşılması yöntemiyle hesaplanmıştır. [3]

Tasarlanan Projenin Amacı ve Önemi

Genellikle elektrik motorunun torkunu ölçmek için başvurulan yöntem, elektrik güç girişini, motoru çalıştıran güç hattındaki voltajı ve akımı ölçmektir. Çoğu motor için tork, akımla doğru orantılıdır , şaft hızı ve motor verimi bilinirse tork değeri akımdan türetilir. Fakat bu, gerçek mekanik tork değil, elektriksel güç miktarlarından teorik ve tahmini bir tork değeri olduğu için dolaylı bir tork ölçümü olarak kabul edilir. [4]

Bununla birlikte, hassas ve doğru bir mil çıkış torku ölçümü için önerilen yöntem ise dinamik tork sensörüdür. Dinamik tork sensörleri, motorlarda, elektrikli el aletlerinde, türbinlerde ve jeneratörlerde, motor tork testi standı için denetim araçları olarak sıklıkla kullanılırlar. Dönen eleman üzerindeki yüzey gerilmelerini yakalayıp diğer yöntemlere nazaran daha hassas ve doğru bir ölçüm sağlarlar. [4]

Bu projede ise, daha doğru ve hassas tork ölçümü sağlayan dinamik tork sensörü yönteminde mile uygulanan torku, milde oluşan burulma açısından faydalanarak hesaplama yöntemi kullanılmıştır. Kayma açısı değeri, tasarlanan encoder sensörlü sistem sayesinde hesaplanıp ve bu açıdan da tork değeri hesaplanacaktır. . Bunun için öncelikle istenilen kayma değerini verecek bir mil tasarlanması ve uygun malzemenin seçilmesi hedeflenmiş, bu doğrultuda da ekonomik, üretimi ve malzeme tedariği kolay, geniş kullanım alanına sahip bir cihaz tasarımı yapılması amaçlanmıştır.

Bu amaçların yanında , tasarlanan bu ürünün hiçbir muâdilinin ülkemizde üretilmemesi sebebiyle ülkemize ithal edilmekte olan bu ürünün, ülkemizde üretilmesine ve ileride bu alanda yapılacak araştırma-geliştirme çalışmalarına katkı sağlamak amaçlanmıştır.

Uygulama Alanları

Günümüzde dinamik tork ölçerlerin kullanım alanına verilebilecek örneklerden biri Şekil 1’de gösterildiği gibi montaj esnasında uygulanan torkun ölçülmesidir. Özellikle bazı kritik montaj hatlarında, operatörün bağlantı elemanlarına uygulanan gerçek torku izlemesi gerekir. Bu, elektrikli ve pinomatik montaj aletleri için daha da önemlidir. Tarımsal kanatlı besleyiciler için kullanılan örnekler görülmektedir, burada cihazımız bir kümes boyunca yemin eşit dağılımından sorumludur. Ziraat mühendisleri, her bir besleyiciyi çalıştıran motorları izlemek için genellikle döner tork sensörlerine bakarlar. [4]



Şekil 1 : Montaj Anı Tork Ölçümü

YÖNTEM ve TASARIM

Bu bölümde, aynı amaçla yapılmış başka projelerde kullanılan yöntemler incelenmiş ve bu proje için seçilen yöntem irdelenmiştir.

Kullanılan Yaygın Yöntemler

Dinamik tork ölçmede kullanılan yöntemlerin başında strain-gauge denen gerinim ölçer sensörlerin kullanılması gelmektedir. Bu metodda, gerinim ölçerler wheatstone köprüsü mantığı

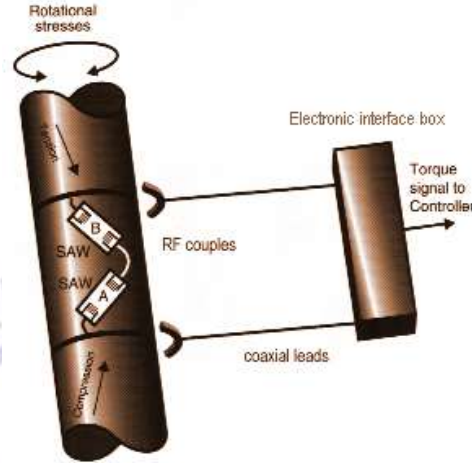
ile şafta yapıştırılır. Şaftın çalışması esnasında yüzeyde meydana gelen kayma sonucunda gerinim ölçerin üzerindeki ince dirençler'in boyunda değişim oluşur ve bu değişim direnç değerlerini değiştirir. Bu direnç değişimi kaydedilerek mil üzerindeki tork hesaplanmaktadır. (bkz. Şekil 2) [5]



Şekil 2 : Strain-Guage Sensör Yapısı ve yerleşimi [6]

Bir diğer yöntem ise akım ve volt bağıntısından faydalanarak motorun gücü hesaplanmaktadır. Bunun için motor bir jeneratöre bağlanmıştır. Jeneratörün performansı kaydedilerek, motorun gücü dolaylı olarak hesaplanmaktadır.

Bir diğer yöntem ise strain-guage yöntemiyle benzerlik gösteren, yüzey akustik dalga sensörü (SAW) kullanılarak torkun ölçülmesidir. Bu sensörler dalga boyları küçük olduğu için yüksek frekans hassasiyetine sahiptir ve bir elektrik sinyalini, aynı frekansta bir akustik sinyale dönüştürebilirler. Bu özellikleri sebebiyle, bir yüzey akustik dalga sensörü, milde oluşan gerilmenin doğurduğu rezonans frekansının değişimini ölçebilir ve bu da torku ölçebilmemizi sağlar (bkz. Şekil 3). [4]



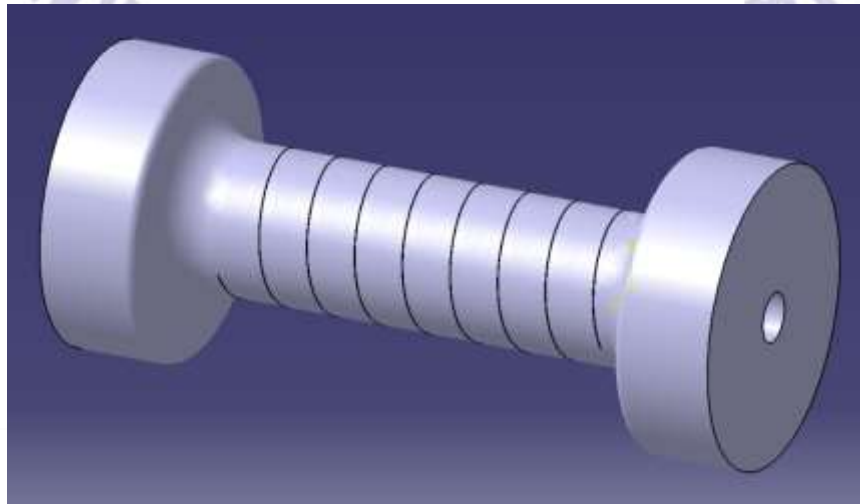
Şekil 3 : SAW Sensör Yapısı [7]

Geliştirilen Yöntem ve Tasarım

Bu projede seçilen dinamik tork ölçüm yöntemi, daha önce de belirtildiği gibi , milin iki ucu arasındaki burulma farkını encoder sistem ile ölçerek tork değerine ulaşmaktır.

Fakat bu yöntemde, üzerinde ölçüm yapılacak olan mil, tasarım sınırlarında belirlenen maksimum değer olan 15 Nm altında, 4 derece kayma alınamamaktadır.

Bu amaç doğrultusunda, belirlenen tasarım kriterlerini sağlayacak özel bir mil tasarlanmıştır . Şekil 4’de gösterilen bu mil, orta kısmı inceltilmiş, içi boş ve spiralli tarzda tasarlanan yapısıyla burulmayı arttırarak, tasarım sınırlarında belirlenen koşullardaki 4 derecelik kayma değerine ulaşılmasına olanak sağlamaktadır.

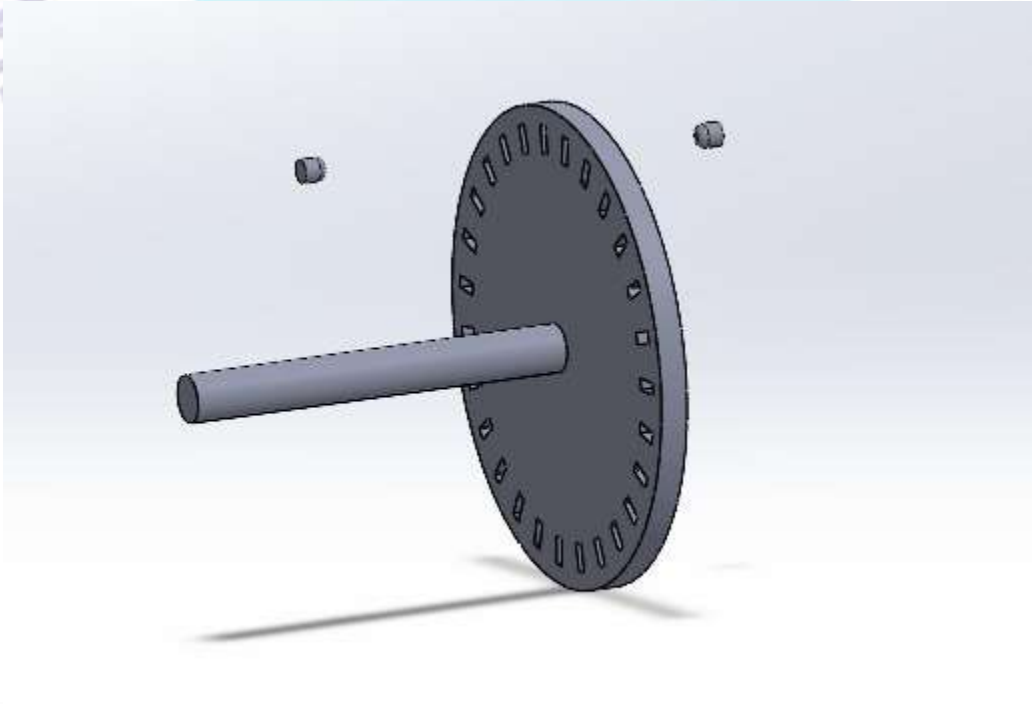


Şekil 4 : Özel Mil Tasarımı

Çalışmamızda kaymanın ölçümünü yapmamızı sağlayacak Rotary enkoderler kapasitif, manyetik ve optik türleri olan, açısal konumu ve hızı ölçmemize yardımcı olan elektromekanik cihazlardır. Enkoderler, otomotiv, robotik ve endüstri gibi birçok sektörde kullanılabilir. Bu alanlarda bize analog ve dijital çıkış vererek kolaylık sağlayan enkoderler önemli bir rol üstlenir. [8]

Encoderin içinde bir ışık ve ışığı disk desenine göre değerlendirebilen, fotoğraflayan ve engelleyen bir fotoğraf algılama aygıtı vardır. Işık atımları elektrik sinyaline dönüştürülmek üzere enkoder çıkışından işlemciye geri gönderilir. Tasarımımızda kullandığımız sistem aşağıda şekil'de mevcuttur.

Birbirlerine yerleştirilmiş iki diskten meydana gelen fotoelektrik kodlayıcı modülünün bir diskinde ışığın kaynağı, diğerinde ise iki ışık alıcı eleman vardır. Bu iki diskin arasında, eşit aralıklı, yarıklı ve hareketli bir disk vardır. Çıkışlarda kare dalga oluşturmak için disk döndürülür ve A ve B ışık alıcılarının bağlantısı sırayla kesilir. Darbe sayımı ile rotasyon miktarına ulaşabiliriz. Çıkış farklarını kontrol edip dönüş yönünü bulmak için A ve B arasındaki 90 derecelik faz farkından yararlanır. Aşağıdaki şekilde sistem mevcuttur.



Şekil 5: Ecoder Prensibi

Seçilen Tasarımın Üstünlükleri

İncelenen yöntemlerden yüzey akustik dalga sensörü ve yüzey gerilim sensörü kullanılan yöntemlerde, dinamik bir sistem üzerinde kullanılacağı için veri aktarımında kablo bağlantısı gerçekleştirilemez. Bu sebeple bu yöntemde genellikle kablosuz haberleşme modülleri kullanılmaktadır, fakat bu projedeki ürün yüksek devirli ve uzun süre çalışan sistemler için tasarlandığından, kablosuz haberleşme modülünün mil üzerinde yüksek merkezkaç kuvvetine maruz kalması, savrulup ayrılma riskini doğurmaktadır. Ayrıca araştırmalar sonucunda bu sensörlerin yüksek sıcaklık altında veya titreşimli çalışma koşullarında stabilite bozulduğu ve hata riskinin arttığı görülmüştür. Bu projede ürünün kullanım alanının olabildiğince geniş tutulması hedeflendiği için, bu durumun ürünün sıcak ortamlarda ve titreşimli çalışma koşullarında, kullanımını sınırlandıracağı görülmüştür. Bu sebeplerden yüzey akustik dalga sensörü ve yüzey gerilim sensörü yöntemi tercih edilmemiştir.

Bir diğer yöntem olan, motorun ürettiği akımdan torka ulaşma yöntemi ise öncelikle dolaylı bir ölçüm yöntemi olmasından ve bu sebepten tam güvenilir sonuç verememesinden tercih edilmemiştir. Ayrıca bu yöntem de ürünün boyutunu ve maliyetini arttırıp, kurulumunu zorlaştırarak ürünün kullanım alanını daraltacağı öngörülmüştür.

Bu problemler göz önüne alınarak bu projede sıcaklık altında önemli derecede etkilenmeyen ve mil üzerine ekstra bir parça monte edilme ihtiyacı doğurmayan , küçük boyutlarda tasarım yapmamıza olanak sağlayan, ürünün kullanım alanını daraltmayan özel mil üzerinde encoder sistemiyle burulmanın ölçülme yöntemi seçilmiştir.

MÜHENDİSLİK HESAPLARI ve ANALİZLER

Bu bölümde, sistemimizdeki mil üzerinden 15 Nm moment altında 4 derece burulma alabileceğimiz özel bir mil tasarımı yapıldı. Yapılan tasarım üzerinde ansys programında analizler yapıldı ve analiz sonuçlarına göre uygun geometri belirlendi , bunun yanında malzeme değişikliğinin etkisi araştırıldı.

Modeller

Öncelikle tasarım , en başta belirlenen ürünün hassasiyetine, yani her iki yönde de maksimum 15 Nm tork değeri altında çalışması ve bu sınır değerinde 4 derece kayma vermesine bağlı olarak

yapıldı. Mildeki kaymayı mm cinsinden hesaplayabilmek için, yay uzunluğu formülünden faydalandı ;

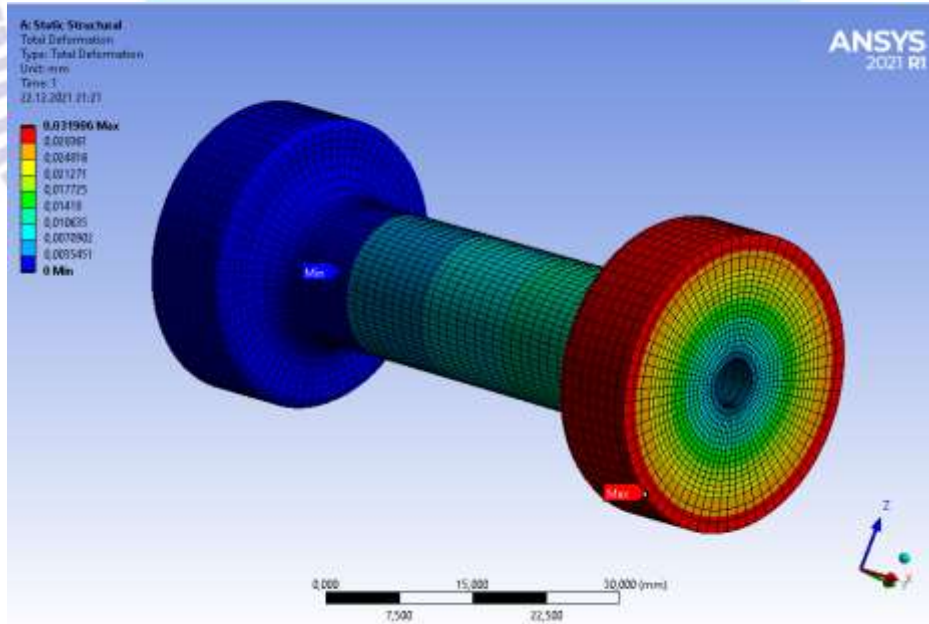
$$Yay\ uzunlu\u011fu = 2\pi r \frac{\theta}{360} \quad (1)$$

Bu formüle g\u00f6re, yay uzunlu\u011funu da 1 mm ye yakın de\u011fer vermesi ve kolaylık sa\u011flaması sebebiyle mil \u00e7apını 30 mm belirledik ;

$$2 \cdot \pi \cdot 15 \frac{4}{360} = 1,047\ mm$$

Esnek ve mukavim olma \u00f6zelli\u011fi m\u00fcnasebetiyle milin malzemesi 50CrV4 (Yay \u00e7eli\u011fi) olarak se\u00e7ildi. Bu kısımda sipiralsiz tasarıma sahip mil \u00fczerinden yola \u00e7ıkarak, analizlerle optimizasyon yaparak uygun kaymayı sa\u011flayacak olan mil geometrisi belirlenmi\u015ftir.

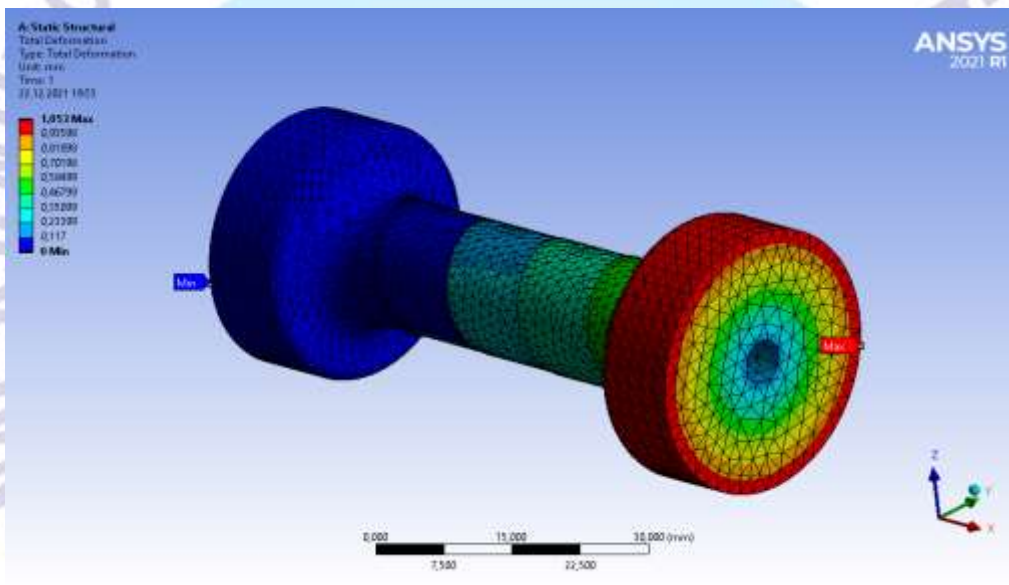
İlk a\u015famada, belirlenen de\u011ferlerle \u015ekil 6 ' da g\u00f6r\u00fcld\u00fc\u011fu gibi d\u00fcz bir mil tasarlandı. Tasarlanan bu milin analizi yapıldığında g\u00f6r\u00fcld\u00fc\u011fu gibi max kayma de\u011feri olarak 0,0319 mm alındı.



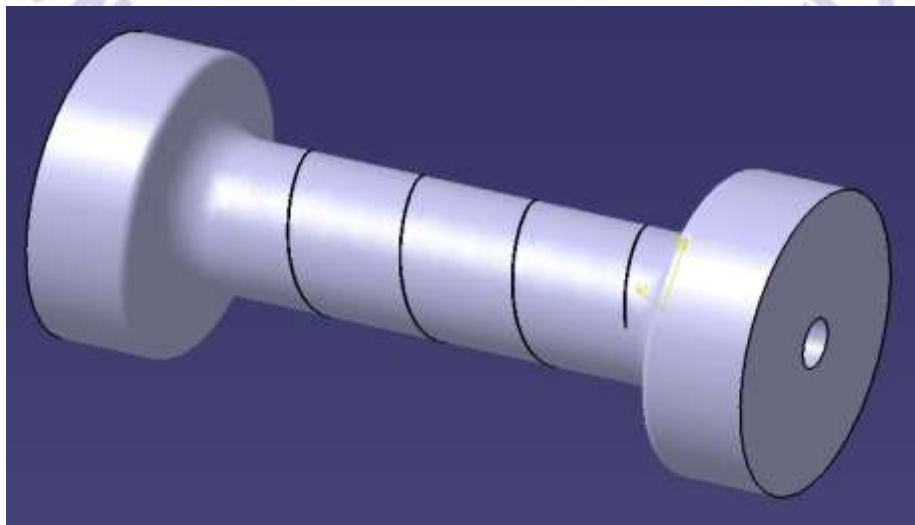
\u015ekil 6

Model I ‘den alınan 0.0319 mm’lik kayma değeri hedeflenen 1 mm lik kaymadan çok uzak olduğu için burulmayı arttıracak bir tasarım yoluna gidildi ve Şekil 10’da görüldüğü gibi bir kesikli tasarım yapıldı. Yay açıklığı ölçüsünde optimazsyon yapıldı ve 5. Modelin analizde alınan 1,05mm ‘lik kayma değeri , hedeflenen 1,047 mm değerine yakın olduğu için, bu model uygun görüldü ve model Şekil 8 ve 9’da görüldüğü şekilde kabul edildi.

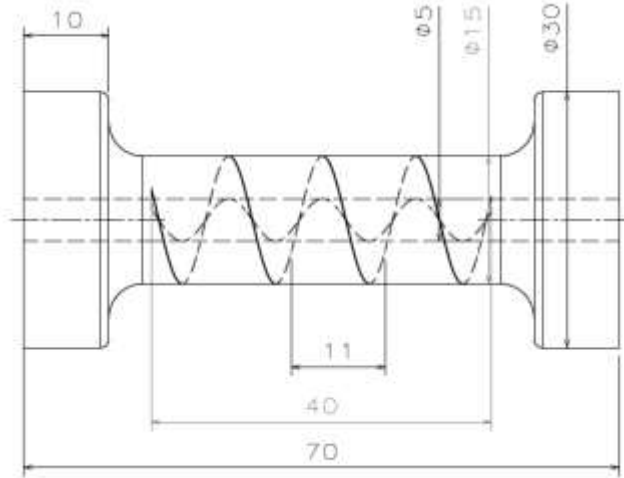
Yaptığımız tüm tasarımların Şekil 10 ve 11’de gösterildiği gibi 6 segman, 2 rulman, 8 vida kullanılarak yapılan ürün montajı simule edilmiştir.



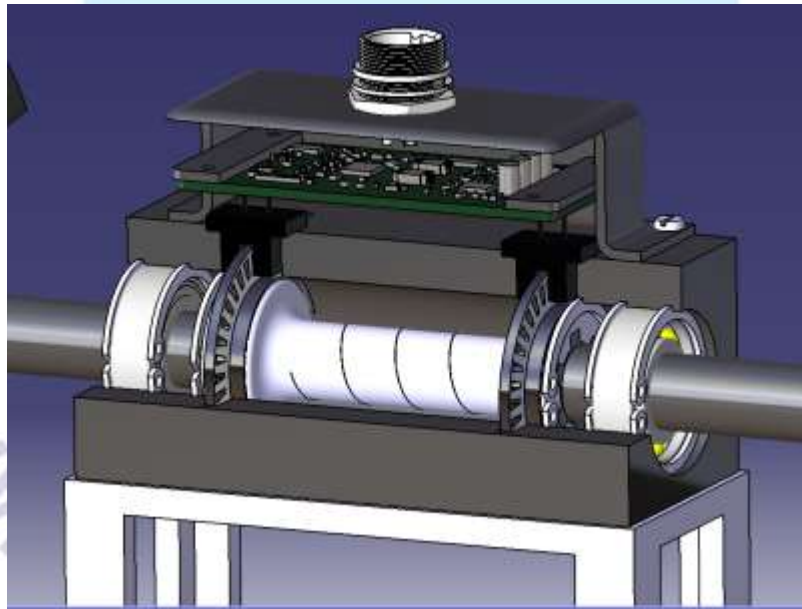
Şekil 7



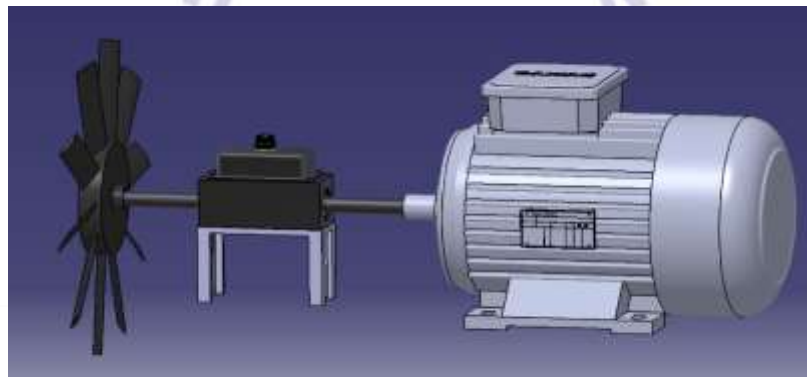
Şekil 8



Şekil 9



Şekil 10



Şekil 11



SONUÇ

Tork, mekanik sistemlerin en önemli parametrelerinden biridir. Dinamik tork ölçümü emniyetli çalışma koşulları sağlamak, sistemi istenilen şekilde kontrol etmek gibi anlık tork bilgisine ihtiyaç duyulan yerlerde kullanılmaktadır. Dinamik tork ölçümü için yüzey sensörleri kullanılan veya akım-tork ilişkisi incelenerek ölçülen sistemler kullanılabilir, bir diğer yöntem olarak bu çalışmada dinamik tork ölçümü, iki uç arasındaki burulmayı ölçen encoder sistemiyle sağlanmıştır. Seçilen bu yöntem diğer yöntemlere göre, kullanım alanının daha geniş olması ve küçük boyutlarda üretilebilmesi açısından üstünlük göstermektedir. Bunun için öncelikle her iki yönde maksimum 15 Nm torkta, 4 derece kayma değerleri, tasarım sınırları olarak belirlenmiş ve sistemde çalışmak üzere mildeki burulmayı istenilen ölçüde arttıracak bir mil tasarımı ve malzeme seçimi yapılmıştır. Yapılan çalışmalar sonucunda, mil geometrisinin ve malzemesinin özelliklerinin, tasarım üzerindeki etkisi incelenmiştir. Aktarım organı olan mil üzerinde yapılan çalışmalar sonucunda düz mile nazaran delikli ve spiral kesiklere sahip milin burulmayı arttırdığı saptanmıştır. Ayrıca milin malzemesi 50CrV4 (Yay Çeliği) seçilmiştir, fakat malzeme değişikliğinin kayma açısı üzerindeki etkisini görmek için alüminyum malzeme için de analizler yapılmıştır. Tasarlanan sistemin detaylı çizimi yapılarak, montajı ve çalışma ortamı simule edilmiş ayrıca gerekli teorik hesaplamalar yapılmıştır. Parçaların üretim yöntemine karar verilip her elemanın maliyet hesabı yapılmıştır.

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DESIGN OF A SERVICE-ENABLED DEPENDABLE INTEGRATION ENVIRONMENT

Fuyang Peng, Donghong Li

Beijing Institute of System Engineering, Beijing, China

Abstract:

The aim of information systems integration is to make all the data sources, applications and business flows integrated into the new environment so that unwanted redundancies are reduced and bottlenecks and mismatches are eliminated. Two issues have to be dealt with to meet such requirements: the software architecture that supports resource integration, and the adaptor development tool that help integration and migration of legacy applications. In this paper, a service-enabled dependable integration environment (SDIE), is presented, which has two key components, i.e., a dependable service integration platform and a legacy application integration tool. For the dependable platform for service integration, the service integration bus, the service management framework, the dependable engine for service composition, and the service registry and discovery components are described. For the legacy application integration tool, its basic organization, functionalities and dependable measures taken are presented. Due to its service-oriented integration model, the light-weight extensible container, the service component combination-oriented p-lattice structure, and other features, SDIE has advantages in openness, flexibility, performance-price ratio and feature support over commercial products, is better than most of the open source integration software in functionality, performance and dependability support.

Keywords: Application integration, dependability, legacy, SOA.

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