

# CERTIFICATE



# PARTICIPATION

## Assas Taqiyeddine

has participated in 4th International Conference on Engineering and Applied Natural Sciences on 20-21 November in 2023 at Konya/Turkey.

PAPER TITLE

*Strain-based finite element formulation for the static, and free vibration analysis of functionally graded plates*

PRESENTATION

Oral

TYPE



الرابط الإلكتروني للمداخلة العلمية الدولية	رقم و تاريخ شهادة المشاركة				تاريخ المداخلة			البلد	عنوان المداخلة	الرقم
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ICEANS 2023 PROGRAM					
Session 1.1			20 NOVEMBER 2023 09:00-11:00		
P.-NO	Time Interval	Title	Author Names	Country	Submission ID
Y-1	09:00-09:10	Talish wheat-grass subalpine meadow formation class	Sanubar Aslanova	Azerbaijan	Mail Submission 2
Y-2	09:10-09:20	Effect of Doxorubicin and Paclitaxel on the Selective Oncogenes Expression Level of Hepatocellular Carcinoma RAS/RAF/MEK/ERK Pathway in Huh 7 Cell Line	Abdul Ghaffar, Yusra Zarlashat, Bushra Munir	Pakistan, Pakistan, Pakistan	Submission 1954
Y-3	09:20-09:30	Cost-Effective Sol-Gel Process for TiO <sub>2</sub> Film Coating on Glass Substrates: Photocatalytic Activity and Structural Characterization	Mohammed Althamthami, Hachemi Ben Temam, Guettaf Temam El Hachmi, Saâd Rahmame, Hadjer Barkat, Hala Nezzal	Algeria, Algeria, Algeria, Algeria, Algeria, Algeria	Submission 1962
Y-4	09:30-09:40	Effects of deposition temperature on electrodeposition of Ni-Mo/TiO <sub>2</sub> alloy coatings	Katia Nasri, Nadia Ait Ahmed, Hamida Issaadi and Nabila Aliouane	Algeria, Algeria, Algeria, Algeria	Submission 1965
Y-5	09:40-09:50	Geodynamic Evolution of North-East Algerian Basin: 3D Velocity Model Reveals High-Temperature Flow	Selma Lamiri , Zohir Radi and Khalissa Layadi	Algeria, Algeria, Algeria	Submission 1966
Y-6	09:50-10:00	Electrochemical corrosion behaviors and protective properties of Ni-Co composite coating prepared on mild steel	Katia Nasri, Nadia Ait Ahmed, Hamida Issaadi and Nabila Aliouane	Algeria, Algeria, Algeria, Algeria	Submission 1967
Y-7	10:00-10:10	On a Mathematical Model to Estimate the Effect of Water-jet Quenching on Steel Beams	Samiha Djemai and Salim Mesbahi	Algeria, Algeria	Submission 1968
Y-8	10:10-10:20	Asymptotic Stability Analysis of Degenerate Reaction-Diffusion Equations	Samiha Djemai and Salim Mesbahi	Algeria, Algeria	Submission 1969
Y-9	10:20-10:30	New Advances in Thermocouple-Based Energy Harvesting	Moulay Omar Mohamed Slimane, MANKOUR Mohamed, Lounis Mourad	Algeria, Algeria, Algeria	Submission 1970
Y-10	10:30-10:40	Computational Insights into the Corrosion Inhibition Potential of Sulfamide Derivatives: A Theoretical Investigation	Abir Boublia, Hana Ferkous and Yacine Benguerba	Algeria, Algeria, Algeria	Submission 1971

Session 1.2			20 NOVEMBER 2023 09:00 11:00		
P.-NO	Time Interval	Title	Author Names	Country	Submission ID
Y-11	09:00-09:10	Understanding the Interaction Configurations and Characteristics of PANI/rGO Nanocomposites: A Comprehensive Computational Analysis	Abir Boublia, Zahir Guezzout, Nacerddine Haddaoui and Yacine Benguerba	Algeria, Algeria, Algeria, Algeria	Submission 1972
Y-12	09:10-09:20	EXISTENCE, UNIQUENESS AND ULAM-HYERS-RASSIAS STABILITY OF DIFFERENTIAL COUPLED SYSTEMS WITH CONFORMABLE FRACTIONAL DERIVATIVE	Samir Aibout	Algeria	Submission 1973
Y-13	09:20-09:30	Watermelon Seed ( <i>Citrullus lanatus</i> ) Extract as a Highly Effective Corrosion Inhibitor for 304L Stainless Steel in Acidic Environments: Comprehensive Experimental and Theoretical Investigation	Abir Boublia, Imane Lakikza, Saousen Imen Aouni and Yacine Benguerba	Algeria, Algeria, Algeria, Algeria	Submission 1974
Y-14	09:30-09:40	The importance of reinforced concrete conduit installed on soil	Chaima Mahkour, Djenette Mendjel and Souhila Rehab Bekkouche	Algeria, Algeria, Algeria	Submission 1975
Y-15	09:40-09:50	Simulation and Study of the Impact of Replacing the Amine Solvent MDEA with DIPA on CO <sub>2</sub> Absorption: An Industrial Case Study in the Algerian Northwest Region	Rafik El Arslene DRA, Amira Ghislaine DRA, Wassila ZIANI CHERIF, Hind TABET DERRAZ	Algeria, Algeria, Algeria, Algeria	Submission 1976
Y-16	09:50-10:00	Star ordering of range symmetric matrices in indefinite inner product space	Abdelkader Benali, SOUAD AYADI, Boudjema Djeffal Khaled, Djilali bekai, Bouzid Houari	Algeria, Algeria, Algeria, Algeria, Algeria	Submission 1977
Y-17	10:00-10:10	Adsorption of dye from waters in western Algeria using natural materials	Tarik Attar, Amal Benkhaled, Esma Choukchou Braham	Algeria, Algeria, Algeria	Submission 1980
Y-18	10:10-10:20	Investigation of structural, electronic, magnetic and thermodynamic properties of a new Heusler compound	F. Bendahma, A. Labdelli, M. Mana, A. Righi, K. Mechehoud, B. Achir, Z. Hamadi	Algeria, Algeria, Algeria, Algeria, Algeria, Algeria, Algeria	Submission 1981
Y-19	10:20-10:30	Numerical modelling of a first order shear deformation finite element model for plate bending	Madjda CHENAFI, Messaoud BOUREZANE, Taqiyeddine ASSAS and Seyfeddine BENABID	Algeria, Algeria, Algeria, Algeria	Submission 1982
Y-20	10:30-10:40	Platinum electrode modified with conductive polymer doped with metallic nanoparticles as sensitive sensor	SMANI Dounia, MAOUCHÉ Naima and KHERFI Amine	Algeria, Algeria, Algeria	Submission 1983

Session 1.3			20 NOVEMBER 2023 10:00-12:00		
P.-NO	Time Interval	Title	Author Names	Country	Submission ID
Y-21	10:00-10:10	Study of the structural and mechanical behavior of thin layers (formation of chromium carbides)	MALLA Meryem, BOUAITA Chiraz Soundes, AISSANI Linda	Algeria, Algeria, Algeria	Submission 1984
Y-22	10:10-10:20	The electronic, elastic and optical properties of SiSn	C.S. Bouaita, B. Bennecer and M. Malla	Algeria, Algeria, Algeria	Submission 1985
Y-23	10:20-10:30	Deformation of Sasaki metric on the tangent bundle	CHAOUI Saadia, ZAGANE Abderrahim	Algeria, Algeria	Submission 1991
Y-24	10:30-10:40	Assessment of an improved finite element for analyzing 2D thermo-mechanical problems	Traka Fatiha, Kamel Meftah and Hossam Djahara	Algeria, Algeria, Algeria	Submission 1992
Y-25	10:40-10:50	A Low Complexity CAD system for Single Lead ECG Beat Classification Based on Hybrid Transforms	Boukaache Abdelnour	Algeria	Submission 1993
Y-26	10:50-11:00	Enhancement of Mechanical Properties of Poly (lactic acid) by Reinforcing with synthesised Hydroxyapatite Nanoparticles	Nedjma Tazibt, Mustapha Kaci, Nadjet Dehouche	Algeria, Algeria, Algeria	Submission 1994
Y-27	11:00-11:10	Free vibration response of a first order shear deformation element using finite element analysis	Madjda CHENAFI, Messaoud BOUREZANE, Taqiyeddine ASSAS and Seyfeddine BENABID	Algeria, Algeria, Algeria, Algeria	Submission 1995
Y-28	11:10-11:20	Buckling analysis of a first order shear deformation element using finite element analysis	Madjda CHENAFI, Messaoud BOUREZANE, Taqiyeddine ASSAS and Seyfeddine BENABID	Algeria, Algeria, Algeria, Algeria	Submission 1996
Y-29	11:20-11:30	Contribution of the strain-based finite element for static bending and free vibration of the functionally graded plates	Assas Taqiyeddine, Bourezane Messaoud, Chenafi Madjda and Seyfeddine Benabid	Algeria, Algeria, Algeria, Algeria	Submission 1998
Y-30	11:30-11:40	Strain-based finite element formulation for the static, and free vibration analysis of functionally graded plates	Assas Taqiyeddine, Bourezane Messaoud, Chenafi Madjda and Seyfeddine Benabid	Algeria, Algeria, Algeria, Algeria	Submission 1999

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# ICEANS 2023



**4th International Conference on Engineering and Applied  
Natural Sciences ICEANS 2023**

November 20-21, 2023: Konya, Turkey

**Abstract Book**

ABSTRACT BOOK OF  
4TH INTERNATIONAL  
CONFERENCE ON  
ENGINEERING AND  
APPLIED NATURAL  
SCIENCES ICEANS 2023

ABSTRACT BOOK OF 4TH ICEANS 2023:

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**20 – 21 November 2023**

**Konya, Turkey**

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## **INTRODUCTION**

We had the great honor of organizing the 4th International Conference on Engineering and Applied Natural Sciences ICEANS 2023. It was truly a great pleasure for us to greet a lot of participants from many different countries attending ICEANS 2023! We firmly believe that the conference will become an important international event in the field of cross-industry discussion about innovations in Academic Studies.

Three cooperating organizations supported the four-day conference. There were 255 papers accepted for presentation at ICEANS 2023, contributed from different countries. We had plenary speeches and several well-known scientists and experts, to give invited talks at different sessions.

The purpose of ICEANS 2023 was to provide a forum for the participants to report and review innovative ideas, with up-to-date progress and developments, and discuss novel approaches to the application in the field of their own research areas and discuss challenges of doing science.

We sincerely hope that the exchange of ideas on doing research, science and improving education will help the participants, and international cooperation sharing the common interest will be enhanced.

On behalf the Organization Committee of ICEANS 2023, we would like to heartily thank our cooperating organizations for all they have done for the conference. We would also like to thank the authors for their contribution to the proceedings; the participants and friends of ICEANS 2023, for their interest and efforts in helping us to make the conference possible; and the Editorial boards for their effective work and valuable advice, especially the ICEANS 2023 secretariat and the ICEANS 2023 staff, for their tireless efforts and outstanding services in preparing the conference and publishing the Proceedings.

Publisher: All Sciences Academy

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6	ŞirvanNeft NQCI madenindeki Artemisietum Salsolosum fosmasyon grubu	Elshad Gurbanov, Sanubar Aslanova, Shahin Ibrahimov	Azerbaijan, Azerbaijan, Azerbaijan	Submission 2002
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11-12	Investigation of The Macro Silicone Softeners on Hydrophilicity of Cotton Knitted Fabrics After Different Processes	Aslıhan KORUYUCU	Turkey	Mail Submission 1
13	Meyan kökünün biyoaktif bileşenleri ve gıdalarda kullanımı	Tarık Pek, Mehmet Akbulut, Hacer Çoklar	Turkey, Turkey, Turkey	Mail Submission 9
14	Effect of Doxorubicin and Paclitaxel on the Selective Oncogenes Expression Level of Hepatocellular Carcinoma RAS/RAF/MEK/ERK Pathway in Huh 7 Cell Line	Abdul Ghaffar, Yusra Zarlashat, Bushra Munir	Pakistan, Pakistan, Pakistan	Submission 1954
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24	Watermelon Seed ( <i>Citrullus lanatus</i> ) Extract as a	Abir Boublia, Imane Lakikza,	Algeria, Algeria,	Submission 1974

	Highly Effective Corrosion Inhibitor for 304L Stainless Steel in Acidic Environments: Comprehensive Experimental and Theoretical Investigation	Saousen Imen Aouni and Yacine Benguerba	Algeria, Algeria	
25	The importance of reinforced concrete conduit installed on soil	Chaima Mahkour, Djenette Mendjel and Souhila Rehab Bekkouche	Algeria, Algeria, Algeria	Submission 1975
26	Simulation and Study of the Impact of Replacing the Amine Solvent MDEA with DIPA on CO <sub>2</sub> Absorption: An Industrial Case Study in the Algerian Northwest Region	Rafik El Arslene DRA, Amira Ghislaine DRA, Wassila ZIANI CHERIF, Hind TABET DERRAZ	Algeria, Algeria, Algeria, Algeria	Submission 1976
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33	The electronic, elastic and optical properties of SiSn	C.S. Bouaita, B. Bennecer and M. Malla	Algeria, Algeria, Algeria	Submission 1985
34	Deep Eutectic Solvent-Based Ultrasound-Assisted Liquid-Liquid Microextraction for the Selective and Sensitive Determination of Erythrosine from Various Samples	Seçkin FESLİYAN, ADİL ELİK	Turkey, Turkey	Submission 1988
35	Deformation of Sasaki metric on the tangent bundle	CHAOUI Saadia, ZAGANE Abderrahim	Algeria, Algeria	Submission 1991
36	Assessment of an improved finite element for analyzing 2D thermo-mechanical problems	Traka Fatiha, Kamel Meftah and Hossam Djahara	Algeria, Algeria, Algeria	Submission 1992
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38	Enhancement of Mechanical Properties of Poly (lactic acid) by Reinforcing with synthesised Hydroxyapatite Nanoparticles	Nedjma Tazibt, Mustapha Kaci, Nadjet Dehouche	Algeria, Algeria, Algeria	Submission 1994
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40	Buckling analysis of a first order shear deformation element using finite element analysis	Madjda CHENAFI, Messaoud BOUREZANE, Taqiyeddine ASSAS and Seyfeddine BENABID	Algeria, Algeria, Algeria, Algeria	Submission 1996
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42	Strain-based finite element formulation for the static, and free vibration analysis of functionally graded plates	Assas Taqiyeddine, Bourezane Messaoud, Chenafi Madjda and Seyfeddine Benabid	Algeria, Algeria, Algeria, Algeria	Submission 1999
43	Photocatalytic Properties of Amorphous Co <sub>3</sub> O <sub>4</sub> Photocatalyst under Visible Light Irradiation	Houda hella, Guettaf Temam EI Hachmi and Guettaf Temam Elhachmi	Algeria, Algeria, Algeria	Submission 2004
44	Study Of Antibacterial Activity Of Methanolic Extract of Launaea Nudicaulis Growing in Bechar, Algeria	Mebarka Belboukhari	Algeria	Submission 2005
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46	BATTERY MANAGEMENT SYSTEM FOR ELECTRIC VEHICLES	Muhammad Sabeeb Shah, Abdullah Abdul Qadeer, Muhammad Zaman, Adnan Hussain, Muhammad Usama Sabeeh Alizai, Arslan Ahmed	Pakistan, Pakistan, Pakistan, Pakistan, Pakistan	Submission 2007
47	Modeling and Assessment Tunnel between Boumedfaa and Djelfa (PPKK 227+200 and 227+800), Algeria	Taleb Hosni Abderrahmane, Cheriet Fayssal, Guemidi Ismahene and Charrak Hicham	Algeria, Algeria, Algeria, Algeria	Submission 2008
48	Optimization of Physico-Chemical Treatment of Wastewater by Coagulation/Flocculation Using Pine Cone Extract as a Natural Coagulant using Response Surface Methodology	Ouiem Baatache, Kerroum Derbal, Abderrezaq Benalia	Algeria, Algeria, Algeria	Submission 2009
49	Mechanism study of the reaction of atomic oxygen O(3P) with the aldehyde but-3-enal	Boulanouar Messaoudi, Mouna Cheriet, Rayenne Djemil and	Algeria, Algeria, Algeria, France	Submission 2010



## Contribution of the strain-based finite element for static bending and free vibration of the functionally graded plates

Assas Taqiyeddine <sup>\*</sup>, Bourezane Messaoud <sup>2</sup>, Chenafi Madjda <sup>3</sup> and Seyfeddine Benabid <sup>4</sup>

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<sup>\*</sup>(taqiyeddine.assas@univ-biskra.dz)

**Abstract –** A novel rectangular finite element with four nodes has been developed in this paper based on the strain approach and the Kirchhoff–Love theory for static bending and free vibration studies of functionally graded material (FGM) plates. Moreover, it is believed that the material characteristics of the plate exhibit a continuous gradient in the direction of its thickness. The material characteristics exhibit a direct power-law distribution with respect to the volume fractions of its elements. The recommended element has been constructed mainly by merging a membrane element named SBRIE (Strain-Based Rectangular In -plane Element) developed by Sabir and A. Sfendji based on assumed strains with two degrees (U, V) of freedom per node and a plate-bending element named KSBQP (Kirchhoff Strain Based Quadrilateral Plate) developed by F. Boussem and L. Belounar based on Kirchhoff–Love theory with three degrees of freedom per node (one transverse displacement W and two normal rotations  $\beta_x, \beta_y$ ). Consequently, each node of the element has a total of five degrees of freedom (U, V, W,  $\beta_x, \beta_y$ ). The performance evaluation of the suggested element is conducted via a series of tests, and the obtained outcomes are then compared with existing solutions documented in the literature. Parametric research is being conducted to investigate the impact of the side-to-thickness ratio and volume fraction index on the static bending behavior, and free vibration characteristics of the functionally graded material (FGM) plates.

**Keywords –** Static Bending · Free Vibration · Functionally Graded · Finite Element. Strain-Based



## Strain-based finite element formulation for the static, and free vibration analysis of functionally graded plates

Assas Taqiyeddine<sup>\*</sup>, Bourezane Messaoud<sup>2</sup>, Chenafi Madjda<sup>3</sup> and Seyfeddine Benabid<sup>4</sup>

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<sup>\*</sup>(taqiyeddine.assas@univ-biskra.dz)

**Abstract –** The objective of this research paper is to evaluate the performance of the strain approach to develop a four-node rectangular finite element based on the stain approach and first-order shear deformation theory. This new element, named MSBRP20 (Mindlin Strain–Based Rectangular plate with 20 degrees of freedom), was developed to investigate the effect of higher-order strain states on the accuracy of plate test results. This element, which contains five degrees of freedom per node, is tested for static and free vibration analysis of functionally graded (FG) material plates subjected to sinusoidal and uniformly distributed transversal loads. And obtained by the superposition of two strain-based elements, where the first is a membrane element named SBRIE (strain-based rectangular in-plane element) developed by Sabir and Sfendji with two-degree degrees of freedom per node ( $u, v$ ), and the second is a reissue-Mindlin plate element called MSBRQP proposed by F.Boussem et al. that has three degrees of freedom per node ( $w, \beta_x, \beta_y$ ) at each of the four corner nodes several numerical tests in both static and free vibration analysis are presented to assess the performance of the new element. The obtained results show high solution accuracy, especially for coarse meshes, for the developed element compared with analytical and other numerical solutions available in the literature.

**Keywords –** Static Bending · Free Vibration · Functionally Graded · Finite Element. Strain-Based