University of Sfax

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11ème Journées des Sciences de l'Ingénieur

JSI'2024, October 11-13, 2024, Sfax, TUNISIA

International Conference on Engineering Science

CES Lab

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TEO

TUNISIAN ENGINEERS ORDER

CERTIFICATE OF PARTICIPATION

This is to certify that **Dr. Habiba Becha** has participated by a technical paper at the JSI'2024 - International Conference on Engineering Sciences which has been held during the period of October 11 - 13, 2024, in Sfax, Tunisia.

Title: Simulation of High Voltage Insulator Performance Using COMSOL Multiphysics

Author(s): Habiba Becha, Hani Benguesmia, Badis Bakri, Zied Driss

JSI'2024 General Chair

Prof. Zied Driss

Journées des Sciences de l'Ingénieur JSI Conference on Engineering Science

International Conferenceon Engineering Science JSI'2024-067
October 11-13, 2024, Sfax, Tunisia

Simulation of High Voltage Insulator Performance Using COMSOL Multiphysics

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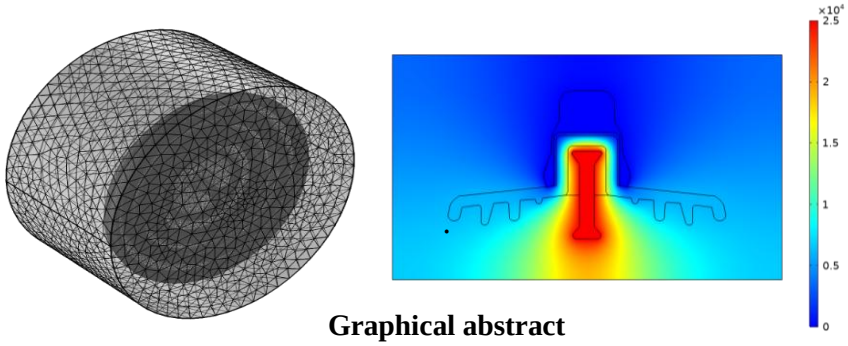
Abstract: The aim of this study is to utilize COMSOL Multiphysics for the numerical simulation of high-voltage insulators. This involves analyzing the behavior of insulators under various conditions, by modeling and simulating the physical phenomena that affect the performance and reliability of high-voltage cap and pin insulators, particularly those used by Algeria's National Electricity and Gas Company, the study aims to provide insights into their behavior under different environmental conditions. The use of COMSOL Multiphysics allows for detailed comparisons between 2D and 3D simulation results, ensuring accurate and reliable predictions that can inform the design and maintenance of high-voltage transmission and distribution lines.

Keywords: Inslators; 2D/3D; Pollution; COMSOL Multiphysics.



Graphical abstract

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11ème Journées des Sciences de l'Ingénieur

JSI'2024, October 11-13, 2024, Sfax, Tunisia

International Conference on Engineering Science

Scientific Program of the JSI'2024

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Scientific Program of JSI’2024

Time	Friday/ October 11, 2024	Saturday / October 12, 2024	Sunday/ October 13, 2024
9:00		Oral session 2	Oral session 5
10:00			Coffee break
10:30		Coffee break	Oral session 6 (Webinar)
11:00		Oral session 3	
11:30			Closing ceremony
12:30		Lunch	Lunch
14:00	Registration		
14:30		Oral session 4	Social program
15:00	Opening ceremony		
15:30	Coffee break	Poster session and Coffee break	
16:00	Oral session 1		
18:00			

WELCOME TO JSI'2024

Registration

14H00-15H00

Opening ceremony including the honoring of retired professors and condolences for Professor Fakher Chaari

15H00-15H30

COFFEE BREAK

15H30-16H00

Oral session 1

16H00-18H00

1. Untargeted phytochemical profiling of Tunisian olive leaves: high added values compound for food and therapeutic application **(JSI'2024-151)**

   Keynote 1: Prof. Mohammed Bouaziz

2. Analysis of Partial Discharge in High-Voltage Cable Insulation: Influence of Heterogeneous Cavity Presence, Location, and Size **(JSI'2024-102)**

   Keynote 2: Hani Benguesmia

3. Entropy generation of the laminar natural convection in a two-dimensional trapezoidal porous cavity filled with hybrid nanofluid flow under magnetic field **(JSI'2024-4)**

   Mohamed A. Medebber

4. Thermal Analysis and Investigation of Chip Formation During Turning of AISI 1045 Steel **(JSI'2024-8)**

   Hamadi billel

5. Optimizing a Hybrid Storage System by Combining Supercapacitors with Lithium-Ion Batteries **(JSI'2024-5)**

   Hadjadj Mouna

6. Modeling of the Stress Intensity Factor of mode I-initiated cracks in thin perforated plates **(JSI'2024-12)**

   Chorfi Sofiane

7. QSPR-ANN Models' Estimation of Thermophysical Properties of Pure Hydrocarbons and Organic Compounds **(JSI'2024-19)**

   Rayene Boutoutane

8. Effects of molybdenum and nickel on microstructures after hardening and wear resistance of austenitic manganese steel **(JSI'2024-28)**

   Hichem Maouche

9. Deep learning methods for predicting the hoop tensile stress-strain curve for anisotropic tubes **(JSI'2024-45)**

   Zied Ktari

10. Study of the indoor thermal comfort testing the opening/closing of the room windows **(JSI'2024-82)**

    Sondes Ifa

Oral session 2

09H00-10H30

Chairmans:

Mohamed Abid (University of Sfax, Tunisia)
Badis Bakri (University of M'sila, Algeria)

1. Heat Exchanger Technology and Applications: Ground source Heat Pump System for Buildings Heating and Cooling **(JSI'2024-144)**
   Keynote 3: Prof. Abdeen Mustafa Omer

2. Study and emerging of a hydroponic greenhouse **(JSI'2024-06)**
   Keynote 4 : Prof. Zied Driss

3. Global optimization of water distribution networks: modeling and simulation **(JSI'2024-21)**
   Keynote 5: Prof. Yasmina Lahiouel

COFFEE BREAK

10H30-11H00

Oral session 3

11H00-12H30

Chairmans:

Costanza Aricò (University of Palermo, Italia)
Jamel Bouaziz (University of Sfax, Tunisia)

1. Determine and calibrate the reliability-based design optimization of composite structures under fatigue stress **(JSI'2024-50)**

   Riyadh Jawad Mutar

2. Integration of the MR damping system in the wind turbine tower **(JSI'2024-52)**

Oumou el mouminine Alaoui

3. The NPR's Effect on the Flow through a Supersonic Nozzle **(JSI'2024-93)**
   Benlembarek.Sabrina

4. Study by simulation the form defect in thin-walled cylinder **(JSI'2024-97)**

   Allal Bedlaoui

5. Combined Convective heat transfer and surface radiation through a coaxial conical cavity **(JSI'2024-105)**
   Belkacem Ould Said

6. Eco-Friendly Water Treatment: Harnessing Seaweed as a Natural Adsorbent for Efficient Safranin O Removal – Optimization and Analytical Insights **(JSI'2024-111)**
   Larbi Haddad

7. Experimental comparative study of the temperature-dependent thermal conductivity of laminated FRP composites **(JSI'2024-113)**
   Wiem Nasri

8. Investigation of pollution effects under AC voltage through experimental study and Comsol Multiphysics simulation **(JSI'2024-158)**

   Hani Benguesmia

LUNCH TIME

12H30-14H30

Oral session 4

14H30-15H30

Chairmans:

Muslum Arici (University of Koaceli, Turkey)
Mouldi Chrigui (University of Gabes, Tunisia)

1. Use of solar distillation to improve the performance of water-cooling solar PV panel **(JSI'2024-32)**
   Keynote 6: A. Muthu Manokar

2. Behavior and properties of industrial and advanced materials analyzes and characterization (**JSI'2024-2)**

Keynote 7: Zidani Mosbah

3. Investigation of the Use of Crab Shells on the Yield of Single-Slope Solar Still (**JSI'2024-125)**

A. Muthu Manokar

4. Optimizing greenhouse design for better plant growth in arid zone: Investigating the impact of roof height (**JSI'2024-129)**

Hasna Abid

5. Numerical simulation of strain rate effects on the mechanical behavior of a two-phase polymer composite (PBT/PTMO) (**JSI'2024-137)**

Ahlem Tahari

6. Optimization in shrink assembly manufacturing **(JSI'2024-53)**

Allal Bedlaoui

POSTER SESSION

15H30-18H00

1. Output voltage control of multilevel boost converter dedicated to photovoltaic system **(JSI'2024-7)**

Dr. Adel Bouchahed

2. Predictive Control Strategy for Three-Phase Inverter **(JSI'2024-9)**

Prof. Abdelfettah BOUSSAID

3. Laboratory study of the mechanical properties of rectangular wires (reinforced with composite fibers) for dental implants and orthodontics. **(JSI'2024-13)**

M. Hassen Merzouk

4. Output voltage control of multilevel boost converter dedicated to photovoltaic system **(JSI'2024-15)**

Adel Bouchahed

5. Vibration analysis in milling based on ANN and instantaneous angular velocities **(JSI'2024-16)**

Dr. Salah HAMMOUDI

6. Enhanced Efficiency of Free Convection in Al2O3-Ag-CuO Ternary Hybrid Nanofluid inside closed Differential-Heated Domain **(JSI'2024-17)**

Prof. El Hocine Mohamed Benhamza

7. Predicting the structural, electronic, and thermoelectric properties of the double half-Heusler alloy ScNbNi2Sn2 **(JSI'2024-31)**

Dr. Houria Mekki

8. Numerical invesigation of thermomechanical coupling during spark plasma sintering process of polycrystalline materials: Effect of side surface radiation on heat transfer **(JSI'2024-33)**

Dr. Farid Mechighel

9. The helical condenser coil's geometry and its impact on heat transfer **(JSI'2024-46)**

Dr. Sami Missaoui

10. Numerical simulation and experimental validation of ductile damage model during drawing process **(JSI'2024-47)**

Mr. Laboubi Salah

11. Characterization and adhesion evaluation of borided and nitrocarborided AISI 4130 steel **(JSI'2024-48)**

Prof. Mohamed Zine Touhami

12. Effect of Microchannel Geometry and Nanofluid Rheological Behaviour on the Cooling Effectiveness of a Microchannel Heat Exchanger **(JSI'2024-55)**

Prof. Mahfoud Kadja

13. Numerical analysis of the mechanical behavior to the ovality of the shell of a rotary kiln of cement **(JSI'2024-57)**

Mohammed Bouhafs

14. Control of a Hybrid Tank System Using Fractional Order $PI^{\lambda}D^{\mu}$ Controller **(JSI'2024-59)**

Mohamed Assabaa

15. Comparative 2D numerical study of a co-current heat exchanger **(JSI'2024-61)**

Bouhamri Noureddine

7. Structural Analysis of a Premolar Tooth Using 3D Finite Element Method **(JSI'2024-62)**

Ali Merdji

8. Experimental study of HDPE by the differential scanning calorimetry (DSC) method **(JSI'2024-65)**

Zemouri Zahia

9. Estimation of Solar Irradiation with Minitab: Case Study of Ain El-Melh, Algeria **(JSI'2024-66)**

Badis Bakri

10. Simulation of High Voltage Insulator Performance Using COMSOL Multiphysics **(JSI'2024-67)**

Habiba Becha

11. Assessment of Polluted Insulator Surface Conditions Using Fuzzy Inference System (FIS) **(JSI'2024-68)**

Habiba Becha

12. DTC strategy of double star induction motor using fuzzy logic enhanced sliding mode controller **(JSI'2024-69)**

Hassen Reghioui

13. Sizing and Comparative Analysis of a Standalone Hybrid Photovoltaic-Wind Energy System with Battery Storage: A Case Study of Two Algerian Cities **(JSI'2024-70)**

Abdellah Draidi

14. Study of the relationship between angular errors and straightness errors of a prismatic axis of a numerically controlled machine tool **(JSI'2024-71)**

Ahlem Mechta

15. First-Principles Analysis of CuMg2InS4: Insights into Optical Properties **(JSI'2024-78)**

Hocine Hayat

16. A Comparative Study of Z-N and HHo based tuning methods in control strategy of DC Motor **(JSI'2024-79)**

Naima Rahoua

17. Optimal control of PMSM motor using SFS algorithm **(JSI'2024-80)**

Naima Rahoua

18. Artificial Intelligence-Based Solar Irradiation Estimation **(JSI'2024-81)**

Badis Bakri

19. Simulation of an unsteady 2D radio frequency inductively coupled plasma ICP/RF **(JSI'2024-92)**

Ahmed Ketata

20. Analysis of the influence of sound pressure levels by geometric shapes using the Ffowcs-Williams and Hawkings (FWH) Technique **(JSI'2024-95)**

Kamel Chadi

21. Comparison between P&O and PSO methods based MPPT algorithm for PV systems under partially shaded conditions **(JSI'2024-96)**

Nacira Tkouti

22. 3D Simulation of the Electric Field on HV Insulators **(JSI'2024-98)**

Hani Benguesmia

23. Power Quality Enhancement of a Low Voltage Network by Using a Photovoltaic Source **(JSI'2024-99)**
Hani Benguesmia

24. A Comparative Study of Different Types of Multilevel Inverters **(JSI'2024-100)**
Nacira Tkouti

25. An image-based visual servoing control approach for quadrotors based on gain-scheduled **(JSI'2024-101)**
Mahdi Labed

26. Numerical Investigation and Mathematical Validation of Cavity- Induced Electrical Constraints in High-Voltage Cable Insulation **(JSI'2024-103)**
Nadjib Kadri

27. Comparative Study of CNC Machine Tools: Evaluating the Efficiency of Three Types **(JSI'2024-104)**
Ahlem Mechta

28. Structural, hydrophobicity and mechanical property of Ti-V-N coatings **(JSI'2024-110)**

Sara Fares

29. Numerical Analysis and Mechanical Characterization of Notched Arc-Shaped PVC Specimens Under Uniaxial Load **(JSI'2024-112)**

Rebehi Kheira

30. Comparison of the power performance of two and three-bladed Savonius rotors **(JSI'2024-114)**
Nour Rabeh

31. Grid Connected Three-Phase Inverter for Systems using Sliding Mode Controller **(JSI'2024-115)**
Hicham Serhoud

32. Numerical investigation of the air-source heat pump water heater with immersed condenser coil under transient conditions **(JSI'2024-117)**
Sami Missaoui

33. CFD study of the aerodynamic performance of a Zephyr wind rotor **(JSI'2024-118)**
Lina Chelbi

34. CFD analysis of blade number optimization in Darrieus wind turbines **(JSI'2024-120)**
Dorra Ghodhbani

35. Experimental evaluation of a solar air heater's efficiency under forced and natural convection **(JSI'2024-121)**

Yassmin Touhami

36. A comparative CFD study between solar stills with and without absorber cylindrical pin fins on the water productivity under Tunisian conditions **(JSI'2024-122)**

Ahmed Ketata

37. Robotic assisted therapy and virtual reality based therapy for neurorehabilitation in MS patients: a comprehensive review of meta-analysis **(JSI'2024-123)**

Imen Ketata

38. Overview of the novel aspiration catheter design (R4Q) for acute stroke thrombectomy **(JSI'2024-124)**

Imen Ketata

39. Structural, hydrophobicity and mechanical property of TiZrN coatings **(JSI'2024-127)**

Linda Aissani

40. Dynamic response of an FG nanobeam rested by an elastic foundation exposed to temperature loads **(JSI'2024-128)**

Lamari Abir

41. Efficient solar tower modeling : A simplified mathematical approach **(JSI'2024-131)**

Haythem Nasraoui

42. Simulation of the effect of biofuel from olive oil waste on the performance and emissions of an internal combustion engine **(JSI'2024-135)**

Munaf Alaseebee

43. Enhanced gear fault classification using MODWPT-based feature extraction and MLP neural network **(JSI'2024-142)**

Ali Damou

44. Study of the structural and electronic properties of double perovskites for energy applications

Imane Layaida

45. Efficiency of GaInP/GaAs DJ solar cell with bottom GaInP base layer

Djedoui Layachi

46. Influence of mechanical ventilation on Greenhouse Microclimate in Sfax City **(JSI'2024-152)**

Hamza Chiboub

47. Employing of laser technique to repair cracks in gas turbine blade **(JSI'2024-153)**

Bassam Alomairi

48. Mechanical properties and buckling of three metals under shot peening (SP) and variable temperature program **(JSI'2024-154)**

Al-Jawaheri A.M.M

49. Study seeding machine efficiency in no-till farming and its impact on soil properties and wheat yield **(JSI'2024-155)**

Osama H. J. Al-Mashhadany

50. Theoretical and experimental analysis of photovoltaic seawater reverse osmosis desalination system **(JSI'2024-156)**

Wisam Hamdan Mousa

51. Modeling and simulation of unstable turbulent flow in a solar heater test bench using ansys software **(JSI'2024-157)**

Fareh Hamrit

COFFEE BREAK

Oral session 5

09H00-10H00

Chairmans:

Imad Hamadneh (University of Jordan, Jordan)
Ammar Hidouri (University of Gafsa, Tunisia)

1. Failure analysis of laminated composites materials carbon/epoxy using piezoelectric pzt smart pastilles and finite element models **(JSI'2024-3)**
   Keynote 8: Prof. Brahim Necib

2. Optimizing methane combustion in aircraft engines with hydrogen blending: Effects and benefits **(JSI'2024-148)**
   Keynote 9: Rachid Renane

COFFEE BREAK

10H00-10H30

Oral session 6 (Webinar)

10H30-11H30

Chairmans:

Nader Haddar (University of Sfax, Tunisia)
Belhi Guerira (University of Biskra, Algeria)

1. Numerical Modeling of Aircraft Cargo Compartment Fire: Flashover and Species Concentration Investigation **(JSI'2024-27)**

   Houssam Eddine Nadir Hiber

2. Numerical Analysis of Thermal Performance in a Multilayer Roof Incorporating Phase Change Materials (PCM) **(JSI'2024-18)**

   Djemaa Guerraiche

3. Experimental study to assess the impact of cracks on the performance of photovoltaic modules **(JSI'2024-83)**

   Hassen Ayed Chraiga

4. Vibro-acoustic analysis in thermal environment of PCLD sandwich beams with viscoelastic cores, frequency and temperature dependent **(JSI'2024-11)**

   Karmi Yacine

5. Mixing performances and hydrodynamic measurements of new chaotic micromixers for non-Newtonian fluids **(JSI'2024-126)**

   Tayeb Naas Toufik

6. Optimizing Power Grid Operations: Data Preparation for Continuous Monitoring Under the Deviation Settlement Mechanism **(JSI'2024-130)**

   Muthu Manokar

7. Corrosion Inspection in Oil and Gas Platforms: A Case Study Utilizing LRUT Technology **(JSI'2024-132)**

   Hemza Gherdaoui

8. Study of scaling defects on the dynamic behavior of spur gears **(JSI'2024-133)**

   Hamza Ghardaoui

9. Entropy generation in MHD heat transfer flow in microchannel **(JSI'2024-147)**

   Antar Tahiri

CLOSING CEREMONY

11H30-12H00

LUNCH TIME

12H30-15H00

SOCIAL PROGRAM