

الكلية متعددة التخصصات - ورازاب  
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FACULTÉ POLYDISCIPLINAIRE DE OUARZAZATE



جامعة ابن زهر  
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UNIVERSITÉ IBN ZOHR



# Congress Program

## AMT'2022

### 7<sup>th</sup> International Congress on Thermal Sciences

Main Theme

### Energy Efficiency, Reality and Perspectives

March 22-23, 2022 - Ouarzazate, Morocco

الكلية متعددة التخصصات - ورازاب  
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FACULTÉ POLYDISCIPLINAIRE DE OUARZAZATE



# Welcome Message

In continuation of the International Congress on Thermal Sciences organized with the support of several research partners, and following the great success of the past six previous editions, the 7<sup>th</sup> edition is organized from 22 to 23 March 2022 in Polydisciplinary Faculty of Ouarzazate-Morocco. It is an opportunity to gather the scientific community around the main theme:

«Energy Efficiency, Reality and Perspectives».

The main purpose of the this edition is to present and discuss the state of the art of energy efficiency, different applications and issues related to thermal sciences, and the latest research unveilings of scientists, their innovations, trends, and concerns. It is an opportunity to highlight the thermal and acoustic problems of the habitat and of collective housing and to identify the challenges, issues, and perspectives as well as the solutions currently adopted or to be proposed in this field.

We hope you enjoy your time with us and we look forward to meeting you all in the 8<sup>th</sup> edition of the AMT conference.

# COMMITTEES

## Honorary Committee

- Mr. Abdelaziz Bendou President of Ibn Zohr University, Agadir-Morocco  
Mr. Lahcen El Maimouni Dean of Polydisciplinary Faculty Ouarzazate-Morocco  
Mr. Hassane Nachit Dean of Faculty of Sciences Agadir, UIZ, Agadir-Morocco  
Mr. Aziz Fassouane Vice-President Ibn Zohr University, Agadir-Morocco  
Mr. Ghadi Fattehallah Vice-President Ibn Zohr University, Agadir-Morocco  
Mr. Ali Rachidi, Dean of Faculty of Applied Sciences Ait Melloul-Morocco  
Mr. Abderrazak Yahyaou Head of the Research Department at Lig'Air, Orléans-France  
Mr. Yassine Tbar Directeur of IFMERE, Ouarzazate-Morocco

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- Pr. Youssef Belkassmi, FPO-UIZ, Ouarzazate-Morocco  
Pr. Thami Ait-Taleb, FPO-UIZ, Ouarzazate-Morocco  
Pr. Lahoucine El Maimouni, FPO-UIZ, Ouarzazate-Morocco  
Pr. Mustapha Najam, Hassan II University, Casablanca-Morocco

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- H. Chaib, Polydisciplinary Faculty of Ouarzazate, Morocco.
- A. Kotri, Polydisciplinary Faculty of Ouarzazate, Morocco.
- A. Fadili, Polydisciplinary Faculty of Ouarzazate, Morocco.
- B. Boughazi, Polydisciplinary Faculty of Ouarzazate, Morocco.
- Y. Haddout, Polydisciplinary Faculty of Ouarzazate, Morocco.
- A. Kharis, Polydisciplinary Faculty of Ouarzazate, Morocco.
- R. Riad, Polydisciplinary Faculty of Ouarzazate, Morocco.
- M. Sahal, Polydisciplinary Faculty of Ouarzazate, Morocco.
- M. Zidane, Polydisciplinary Faculty of Ouarzazate, Morocco.
- K. Khallaki, National School of Applied Sciences Khouribga, Morocco.

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A.	Bahlaoui	FP Beni Mellal, USMS, Morocco
L.	Bammou	FS Agadir, UIZ, Morocco
S.	Belhouideg	FP Beni Mellal, USMS, Morocco
Y.	Belkasmi	FP Ouarzazate, UIZ, Morocco
A.	Benami	FST Errachidia, UMI, Morocco
B.	Benhamou	FSS Marrakech, UCA, Morocco
L.	Boukhattem	ENSA Safi, UCA, Morocco
H.	Chaib	FP Ouarzazate, UIZ, Morocco
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K.	Choukairy	ENSA Khouribga, USMS, Morocco
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M.	Daya	FST Errachidia, UMI, Morocco
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L.	Elmaimouni	FP Ouarzazate, UIZ, Morocco
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M.	Elyaqouti	FS Agadir, UIZ, Morocco
S.	Er-Raki	FST Marrakech, UCA, Morocco
E.	Essaghir	FS Casablanca, UH2, Morocco
J.	Ezzahar	ENAS Safi, UCA, Morocco
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K.	Gueraoui	University of Ottawa, Canada
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S.	Haddout	FS Kénitra, UBT, Morocco
B.	Hamri	EMI Rabat, Morocco
S.	Hayani Mounir	FP Khouribga, USMS, Morocco

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A.	Khabbazi	EST Salé, UM5, Morocco
N.	Khalidi	EST Guelmim, UIZ, Morocco
K.	Khallaki	ENSA Khouribga, USMS, Morocco
R.	Khatyr	FSAC, Casablanca, UH2, Morocco
A.	Kheiri	University of Lorraine France
A.	Khourchafi	ENSEM Casablanca, UH2, Morocco
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M.	Kriraa	ENSA Safi, UCA, Morocco
Y.	Lachtioui	FST Béni Mellal, USMS, Morocco
F.	Lakrad	FSAC Casablanca, UH2, Morocco
A.	Lamharrar	ENS Marrakech, UCA,
R.	Lbibb	FST Mohammedia, UH2, Morocco
G.	Mangoub	FST Settat, UH1, Morocco
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I.	Sobhi	ENA Marrakech, Morocco
K.	Souhar	FS Agadir, UIZ, Morocco
A.	Tilioua	FST Errachidia, UMI, Morocco
S.	Yadir	ENSA Safi, UCA, Morocco
M.	Zaydan	FS Casablanca, UH2, Morocco

# Speakers



Mr Touzani est lauréat de l'École Nationale des Industries chimiques de Nancy, France (1980). Après des études doctorales à l'école polytechnique de Montréal (Canada, 1985), il a intégré l'École Mohammedia d'ingénieurs de Rabat en 1986 en tant qu'enseignant-chercheur. Il est actuellement consultant en efficacité énergétique et énergies renouvelables auprès du cabinet ALGEES. Mr. Abdellatif Touzani dispose d'une solide expérience dans les questions et problématiques liées aux changements climatiques, l'intégration des mesures d'efficacité énergétique, le développement durable et une production plus propre dans l'industrie le bâtiment, le transport et l'agriculture. Au cours des dernières années, son engagement dans l'amélioration de la performance énergétique et environnementale dans plusieurs entreprises a conduit à des mesures concrètes pour la fixation des objectifs et la mise en œuvre de projets de production plus propre, d'efficacité énergétique et des énergies renouvelables. Pendant la dernière décennie, M. Touzani a été engagé dans la conception durable de projets d'investissement qui ont démontré un potentiel considérable pour l'amélioration de la performance environnementale et énergétique des entreprises. En tant que conseiller énergétique, et en tant que qu'accompagnateur de projets de production plus propre, M. Touzani a accumulé un savoir-faire étendu de l'intégration du développement durable dans les projets.

Mr Touzani a participé à plusieurs programmes internationaux notamment:

- Appui Technique au Maroc pour préparer la mise en œuvre de la Contribution Déterminée au Niveau National au profit de la Banque Mondiale.
- Étude pour l'Élaboration d'une Stratégie de Développement à Faibles Émissions de GES ou sobre en carbone (Low Emissions Development Strategy « LEDS») dans tous les secteurs.
- Montage du projet : Efficacité énergétique dans le secteur industriel au Maroc pour le compte de L'Agence Africaine de développement en tant que coordinateur national du projet.
- Évaluation du projet CEEB : code d'efficacité énergétique dans le bâtiment au Maroc pour le compte du PNUD/ADEREE.
- Renforcement de la performance énergétique de 30 entreprises marocaines et 15 entreprises égyptiennes. Projet financé par le département d'état (USA) en partenariat avec le World Environment Center.
- Projet sur le transfert de meilleures technologies environnementales dans la région sud de la méditerranée « MED-TEST », Maroc, Tunisie, Egypte. Pour le compte de l'ONUDI.
- Projet pilote au profit d'un secteur industriel pour la mise en place de solutions de la P+P pour le compte de la Banque mondiale.
- Évaluateur de projets d'efficacité énergétique et d'énergies renouvelables pour le compte de la BERD (Projet MORSEFF).
- Audit énergétique de plus de plus de 200 entreprises nationales et internationales (Industrie, bâtiment et agriculture).
- Accompagnement de 15 entreprises marocaines à la certification ISO 50001.
- Formateur dans le domaine de l'efficacité énergétique dans l'industrie et bâtiment.



Dr Mohamed Asbik is actually a Professor of Thermal Engineering at Mohammed V University, ENSAM-Rabat (Morocco), after being recruited by Moulay Ismaïl University "Faculté des Sciences et Techniques" in 1994 and then transferred to Faculty of Sciences (Meknè, Morocco). He started his academic career with a Master's degree in 1990 from "Université de Perpignan Via Domitia, France)" and he earned his PhD degree (1993) through the same university. Moreover, he got his "Doctorat d'État es Sciences", in 1999 from Moulay Ismaïl University (Faculty of Sciences, Meknès), in Engineering Sciences (Energetic field).

Professor Mohamed Asbik has published many articles in International journals (indexed in Scopus) and he had got several patents. In addition, he has supervised many PhD theses which were defended in Renewable Energy and thermal engineering fields. In addition, he is a reviewer of several peer-review journals, scientific conferences and organizations, on Energy. He is an expert-consultant (or expert-evaluator) within various institutions.

Professor Mohamed Asbik was also involved in several national and international research projects as a member or a coordinator: RS/2011/02, VERA\_1 and VERA\_2 funded respectively by: CNRST and "Région Centre Val de Loire, France". Actually, he is the coordinator of a national research project (BioF2S) and more recently a member of "Lenium SolarWater" supported by IRESEN and IRESEN(Morocco)/ CDTI(Spain).



Professor M. Cherkaoui, Vice-Director of Research and Cooperation at the Ecole des Mines de Rabat, is a graduate of the University of Paris XI specializing in Energy Engineering.

Dr. M. Cherkaoui is a member of National Comity of Energy, member of team the Optimization, control of energy systems and AI, Applied Mathematics Laboratory.

His research interests: Urban Climate Change, BIM to BEM; Building Information Modeling and Building Energy Modeling, Energy Efficiency; Exergy Analysis Pintch Method, Characterization of Building Materials.

He teaches courses on Energy Efficiency, Renewable Energies, Climate Change At Ecole Des Mines, Mohammadia School Of Engineers, IAV Rabat.

The expertise covers several industrial domains; Carbon Footprint And Greenhouse Gas Reduction, ISO 50001 Energy Management System, Energy Audit Etc...



Dr. Abdelkader Outzourhit holds a PhD degree in Applied Physics from the Colorado School of Mines, Golden, CO, USA (1992), a master's degree in physics from the same School and a bachelor degree from the Cadi Ayyad University in 1985. He is currently a professor at the department of physics of the Faculty of Sciences, Cadi Ayyad University (in Marrakech, Morocco), the director of the Center for Analysis and characterization His research is centered on the fabrication of novel materials and solar cells, renewable energies and the coupling of various energy resources (hybrid systems). He has participated in several EU-funded projects on renewable energies, desalination and hybrid systems including hydrogen subsystems (JatroMed, HYRESS, ADIRA, ADURES, HYP A). He also led several national projects on renewables (HYBRIDBATH, TAHALAGRID, PPR2 on Novel Solar Cells based on perovskite). He participated in Erasmus° projects QESAMED, AFREQEN and PROEMED. He authored and co-authored more than 250 articles covering thin films, solar cells (a-Si:H, perovskites, kesterites, oxides), renewable energies, batteries, photocatalysis, electrodeposition and anodization. He chaired the Solid-state Physics and Thin Films Laboratory which later became Laboratory for Nanomaterials, Energy and Environment, where he set-up the first chemistry/electrochemistry unit to complement the PVD techniques of the Laboratory (rf-sputtering, evaporation) with chemical and electrochemical deposition techniques. His expertise include scanning electron microscopy (since 200), XRD (including GIXRD, SAX, reflectometry, high resolution, in-stu.), EXAFS, impedance spectroscopy AFM, integration and optimization of renewable energy sources in buildings He served as a reviewer for several journals including solar energy materials and solar cells. He coordinated several graduate and undergraduate programs at the university on renewables and nanomaterials (master degree, DESA, and bachelor). He was a member of the Solar Decathlon SDA2019 winning team (Interhouse)

<https://scholar.google.com/citations?user=M8rw3ecAAAAJ&hl=fr&cstart=80&pagesize=20>



Tuesday, 22 March 2022 (GMT + 1)

8h30-9h00	Welcoming Participants	
9h00-10h00	Official opening of the conference Moderator : Lahoucine Elmaimouni, FP Ouarzazate, UIZ-Morocco	
Zoom Link	<a href="https://us05web.zoom.us/j/81427204403?pwd=YmdvN2VVCV3ppdTVZcDdrV084b0p0Zz09">https://us05web.zoom.us/j/81427204403?pwd=YmdvN2VVCV3ppdTVZcDdrV084b0p0Zz09</a>	
10h00-11h15	Plenary Session: ✓ <b>Speaker 1:</b> Dr. Abdellatif Touzani, Mohammadia School of Engineers, Mohamed-V University, Rabat-Morocco <b>“Energy efficiency in buildings”</b> <b>Moderator:</b> Brahim Benhammou, FSS Marrakech, UCA, Morocco	
11h15-11h30	Coffee Break	
11h30-12h45	Plenary Session: ✓ <b>Speaker 2:</b> Moha Cherkaoui, Ecole des Mines de Rabat, Mohamed-V University, Rabat-Morocco <b>“Exergy Analysis Pinch Method, Heat”</b> <b>Moderator:</b> Thami Ait-Taleb, FPO-Ouarzazate-Morocco	
12h45	Lunch Break	
	Session by topics	
14h00-16h15	Oral Session 1:	Track : Heat and mass transfer & Fluid mechanics <a href="https://us05web.zoom.us/j/81427204403?pwd=YmdvN2VVCV3ppdTVZcDdrV084b0p0Zz09">https://us05web.zoom.us/j/81427204403?pwd=YmdvN2VVCV3ppdTVZcDdrV084b0p0Zz09</a>
	Oral Session 2:	Track : Renewable energies <a href="https://us05web.zoom.us/j/88364631594?pwd=VjhzaI9VUmhrdJlU1Wk5ySDlrSVo1UT09">https://us05web.zoom.us/j/88364631594?pwd=VjhzaI9VUmhrdJlU1Wk5ySDlrSVo1UT09</a>
	Oral Session 3:	Track : Renewable energies <a href="https://us05web.zoom.us/j/83105280767?pwd=YkU4Ui9BeVhoTW1KQVEyVVJMTjZzd09">https://us05web.zoom.us/j/83105280767?pwd=YkU4Ui9BeVhoTW1KQVEyVVJMTjZzd09</a>
16h15-18h30	Oral Session 4:	Track : Heat and mass transfer & Fluid mechanics <a href="https://us05web.zoom.us/j/81427204403?pwd=YmdvN2VVCV3ppdTVZcDdrV084b0p0Zz09">https://us05web.zoom.us/j/81427204403?pwd=YmdvN2VVCV3ppdTVZcDdrV084b0p0Zz09</a>
	Oral Session 5:	Track : Environment-friendly thermal systems <a href="https://us05web.zoom.us/j/88364631594?pwd=VjhzaI9VUmhrdJlU1Wk5ySDlrSVo1UT09">https://us05web.zoom.us/j/88364631594?pwd=VjhzaI9VUmhrdJlU1Wk5ySDlrSVo1UT09</a>
	Oral Session 6:	Track : Heat and mass transfer & Fluid mechanics <a href="https://us05web.zoom.us/j/83105280767?pwd=YkU4Ui9BeVhoTW1KQVEyVVJMTjZzd09">https://us05web.zoom.us/j/83105280767?pwd=YkU4Ui9BeVhoTW1KQVEyVVJMTjZzd09</a>

Wednesday, 23 March 2022 (GMT + 1)

Zoom Link	<a href="https://us05web.zoom.us/j/81427204403?pwd=YmdvN2VVCV3ppdTVZcDdrV084b0p0Zz09">https://us05web.zoom.us/j/81427204403?pwd=YmdvN2VVCV3ppdTVZcDdrV084b0p0Zz09</a>	
9h00-10h00	Plenary Session: ✓ <b>Speaker 3:</b> Abdelkader Outzourhit, Faculty of sciences, Cadi Ayyad University – Marrakech <b>“Multi objective optimisation techniques for high performance buildings”</b> <b>Moderator:</b> Ghita Mangoub, FST Settat, UH1, Morocco	
10h00-11h00	Plenary Session: ✓ <b>Speaker 4:</b> Mohamed Asbik, National High School of the Arts and Professions, Mohamed V University- ENSAM, Rabat <b>“Energy Storage”</b> <b>Moderator:</b> Kaoutar Khallaki, ENSA Khouribga, USMS, Morocco	
11h00-11h15	Coffee Break	
	Session by topics	
11h15-12h45	Oral Session 7:	Track : Energy efficiency and artificial intelligence <a href="https://us05web.zoom.us/j/81427204403?pwd=YmdvN2VVCV3ppdTVZcDdrV084b0p0Zz09">https://us05web.zoom.us/j/81427204403?pwd=YmdvN2VVCV3ppdTVZcDdrV084b0p0Zz09</a>
	Oral Session 8:	Track : Energy efficiency and artificial intelligence <a href="https://us05web.zoom.us/j/88364631594?pwd=Vjhzai9VUmhrdjU1Wk5ySDlrSVo1UT09">https://us05web.zoom.us/j/88364631594?pwd=Vjhzai9VUmhrdjU1Wk5ySDlrSVo1UT09</a>
	Oral Session 9:	Track : Phase change materials and energy storage <a href="https://us05web.zoom.us/j/83105280767?pwd=YkU4Ui9BeVhoTW1KQVEyVVJMTjZzd09">https://us05web.zoom.us/j/83105280767?pwd=YkU4Ui9BeVhoTW1KQVEyVVJMTjZzd09</a>
12h45	Lunch Break	
	Session by topics	
14h00-16h15	Oral Session 10:	Track : Thermal and acoustic characterization of local building materials <a href="https://us05web.zoom.us/j/81427204403?pwd=YmdvN2VVCV3ppdTVZcDdrV084b0p0Zz09">https://us05web.zoom.us/j/81427204403?pwd=YmdvN2VVCV3ppdTVZcDdrV084b0p0Zz09</a>
	Oral Session 11:	Track : Phase change materials and energy storage <a href="https://us05web.zoom.us/j/88364631594?pwd=Vjhzai9VUmhrdjU1Wk5ySDlrSVo1UT09">https://us05web.zoom.us/j/88364631594?pwd=Vjhzai9VUmhrdjU1Wk5ySDlrSVo1UT09</a>
	Oral Session 12:	Track : Heat and mass transfer & Fluid mechanics <a href="https://us05web.zoom.us/j/83105280767?pwd=YkU4Ui9BeVhoTW1KQVEyVVJMTjZzd09">https://us05web.zoom.us/j/83105280767?pwd=YkU4Ui9BeVhoTW1KQVEyVVJMTjZzd09</a>
16h15-17h30	Oral Session 13:	Track : Thermal systems and combustion <a href="https://us05web.zoom.us/j/81427204403?pwd=YmdvN2VVCV3ppdTVZcDdrV084b0p0Zz09">https://us05web.zoom.us/j/81427204403?pwd=YmdvN2VVCV3ppdTVZcDdrV084b0p0Zz09</a>
	Oral Session 14:	Track : Measurements techniques in thermal sciences <a href="https://us05web.zoom.us/j/88364631594?pwd=Vjhzai9VUmhrdjU1Wk5ySDlrSVo1UT09">https://us05web.zoom.us/j/88364631594?pwd=Vjhzai9VUmhrdjU1Wk5ySDlrSVo1UT09</a>
	Oral Session 15:	Track : Thermal and acoustic characterization of local building materials <a href="https://us05web.zoom.us/j/83105280767?pwd=YkU4Ui9BeVhoTW1KQVEyVVJMTjZzd09">https://us05web.zoom.us/j/83105280767?pwd=YkU4Ui9BeVhoTW1KQVEyVVJMTjZzd09</a>
17h30-18h00	<a href="https://us05web.zoom.us/j/81427204403?pwd=YmdvN2VVCV3ppdTVZcDdrV084b0p0Zz09">https://us05web.zoom.us/j/81427204403?pwd=YmdvN2VVCV3ppdTVZcDdrV084b0p0Zz09</a>	
	Conference Closure	

# Sessions

Session 1		<b>Track : Heat and mass transfer &amp; Fluid mechanics</b> <b>Tuesday, 22 March 2022 (GMT+1) 14h00-16h15</b>	
Moderators	Moderator : Mbarek Feddaoui, ENSA Agadir, UIZ, Morocco Co-Moderator : Ahmed Bahlaoui, FP Beni Mellal Morocco Co-Moderator : Rabha Khatyr, FSAC, Casablanca, UH2, Morocco Co-Moderator : Monssif Najim, ENSA Agadir, UIZ, Morocco		
Zoom Link	<a href="https://us05web.zoom.us/j/81427204403?pwd=YmdvN2VCV3ppdTVZcDdrV084b0p0Zz09">https://us05web.zoom.us/j/81427204403?pwd=YmdvN2VCV3ppdTVZcDdrV084b0p0Zz09</a>		
ID paper	Authors	Title	
8	Faraj Mustapha	Investigation by LBM of heat transfer within fins equipped channel heated by a heat source.	
9	Mourad Najjaoui, Thami Ait Taleb, Abdelhalim Abdelbaki, Zaki Zrikem and Hassan Chaib	Effect of the Number of Air Cells in the Horizontal Direction on the Coupled Heat Transfers through an Alveolar Structure Submitted to an Incident Solar Flux.	
10	Bilal Elhadoui, Mourad Kaddiri, Mohamed Lamsaadi and Hassan El Harfi	Effect of the Thermal Rayleigh Number on Natural Double Diffusive Convection in Shallow Rectangular Cavities Filled with Nanofluids.	
14	Aboubakr Herouane, Thami Ait Taleb and Mourad Tahajanan	Simulation of a Cylindrical Solar Chimney for Buildings Refreshment in Arid Climatic Zone.	
18	Chadia Haidar, Abdellatif El Hannaoui and Rachid Boutarfa	Transferts de chaleur convectifs dans un entrefer d'un système rotor-stator soumis à un jet excentrique.	
19	Ahmed Idrissi, Abdelkhalek Cheddadi, Mohamed Touhami Ouazzani and Brahim El Moustaine	Analysis of Heat Transfer in a Cylindrical Annulus Fitted with Two Inverted Trapezoidal Isothermal Blocks Attached Symmetrically at Inner Cylinder.	
22	Brahim El Moustaine, Abdelkhalek Cheddadi and Ahmed Idrissi	Critical Thermosolutal Convection of Air-Solute Mixtures in a Narrow Annular Cavity with Opposite Thermal and Mass Rayleigh Numbers.	
29	Ilham Erritali, Mourad Kaddiri, Ismail Arroub and Hamza Daghab	Effects of Temperature Dependent Viscosity and Richardson Number on Mixed Convection with the Presence of Thermal Radiation in Lid-Driven Square Cavity.	
30	Ismail Arroub, Ahmed Bahlaoui, Soufiane Belhouideg, Abdelghani Raji and Mohammed Hasnaoui	Numerical investigation of mixed convection in a tilted multi-vented cavity filled with Nano-fluid considering different positions of the outlet port.	
31	Ilham Erritali, Mourad Kaddiri, Ismail Arroub and Hamza Daghab	Prandtl Number and Thermal Radiation Effects on Combined Natural and Forced Convection in Lid-Driven Square Cavity.	
Session 2		<b>Track : Renewable energies</b> <b>Tuesday, 22 March 2022 (GMT+1) 14h00-16h15</b>	
Moderators	Moderator : Khaldi Naoufel, Higher School of Technology-Guelmim, Morocco Co-Moderator : Soufiane Belhouideg, FP Sultan Moulay Slimane University, Béni-Mellal, Morocco Co-Moderator : Mounia Achak, ENSA El Jadida, University of Chouaib Doukkali Co-Moderator : Fatima El Guezar, ENSA Agadir, UIZ, Morocco		
Zoom Link	<a href="https://us05web.zoom.us/j/88364631594?pwd=Vjhzei9VUmhrdU1Wk5ySDlrSVo1UT09">https://us05web.zoom.us/j/88364631594?pwd=Vjhzei9VUmhrdU1Wk5ySDlrSVo1UT09</a>		

ID paper	Authors	Title
13	Hassan Najih, Lahecn Boulkadad, Zakaria Alami Ibrahimi, Abdellah Tihane, Abdessalam Elfanaoui and Ahmed Ihlal	Effects of ambient humidity on MAPbI <sub>3</sub> perovskite thin films stability.
17	Zainab Ben Seddik, Mohamed Ahachad, Mustapha Mahdaoui, Houda El Idrissi and Zineb Laaroussi	Energetic, Economic, and Environmental comparative analysis of performance between PVT and PV/FPC systems in Morocco.
27	Dris Ben Hmamou, Mustapha Elyaqouti, El Hanafi Arjdal, Driss Saadaoui, Souad Lidaighbi, Rabya Aqel, Daoudi El Fatmi and Imade Chouli	Extraction of unknown parameters of single diode model of photovoltaic cell using approach based on evolutionary algorithm.
40	Badr Benyachou, Bennasser Bahrar, Kamal Gueraoui, Mohammed Saidi Hassani Alaoui and Mohammed Eddabaha	Control of the offshore wind energy conversion system based on a DFIG to optimize the production.
44	Errami Younes, Fatima Ezzahra Allali, Demrati Hassan, Gourdo Lahoucine, Aharoune Ahmed, Bouirden Lahcen and Wifaya Ahmed	Etude l'effet d'ombre sur le micro-climat d'une serre canarienne dans les régions arids et semi-arids
56	Hanane Etabti, Asmae Fitri, Adil Touimi Benjelloun, Mohammed Benzakour and Mohammed Mcharfi	A DFT/TD-DFT Study of the Influence of Anchoring Group and Internal Acceptor of Benzocarbazole-based D-A'-π-A Dyes for DSSCs
70	Essaadia Oublal, Abdelaziz Ait Abdelkadir and Mustapha Sahal	Optimization of a solar cell based on Tin Sulfide with different BSF materials-Numerical approach
72	Imade Choulli, Mustapha Elyaqouti, Dris Ben Hmamou, Elhanafi Arjdal, Driss Saadaoui, Souad Lidaighbi and Khalid Assalaou	Modelisation et caracterisation des dispositifs photovoltaïques
74	Ouqazzamar Radiya, Yadir Said and Oudrhiri Hassani Fahd	modélisation de l'irradiation directe normale (DNI): cas Almeria
95	Abdelaziz Ait Abdelkadir, Mustapha Sahal and Essaadia Oublal	Performance enhancement of CIGS-based Solar cells
135	Abdellah Hbab, Said Amounas, Hassan Chaib, Thami Ait-Taleb and Abdelhakim Nafidi	DFT based investigation of the structural and electronic properties of ferroelectric phase of lithium niobate
103	Mohamed Hissouf, M'Barek Feddaoui, Khadija Zabour and Abdellatif Dayf	Evaluation of Energy Production of a Hybrid PV/T Collector Based on Different Fluids for Agadir Climate

Session 3	<b>Track : Renewable energies</b> <b>Tuesday, 22 March 2022 (GMT+1) 14h00-16h15</b>	
Moderators	Moderator : Ali Idlimam, ENS, UCA-Marrakech, Morocco Co-Moderator : Khaled Chetehouna, INSA Centre Val de Loire-France Co-Moderator : El Hanafi Arjdal, FSA,UIZ-Agadir-Morocco Co-Moderator : Khalid Assalaou, FSA Agadir, UIZ, Morocco	
Zoom Link	<a href="https://us05web.zoom.us/j/83105280767?pwd=YkU4Ui9BeVhoTW1KQVEyVWJMTjZkdz09">https://us05web.zoom.us/j/83105280767?pwd=YkU4Ui9BeVhoTW1KQVEyVWJMTjZkdz09</a>	
ID paper	Authors	Title
4	Abderrahim Bazgaou, Hicham Fatnassi, Lahcen Bouirden and Ahmed Aharoune	Effect of active solar heating system on microclimate, development, yield and fruit quality

		in greenhouse tomato production
92	Lhoussayne Et-Taya, Lahoucine Elmaimouni and Abdellah Benami	A Comparative Study Of Different Active Layers For The Earth-Abundant Low-Cost Thin-Film Solar Cells Using SCAPS-1D Program
94	Abdelaziz Ait Abdelkadir, Essaadia Oublal and Mustapha Sahal	Theoretical analyses of new tandem solar cells based on CdTe Using SCAPS-1D
100	Lahoucine Gourdo, Khadija Achgar, Ahmed Chraïbi, Hicham Fatnassi, Hassan Demrati, Ahmed Wifaya, Rachid Bouharrou, Ahmed Aharoune and Lahcen Bouirden	Study of solar passive water –sleeve heating system installed under Multi-span greenhouse: effect on tomato crop yield and Tuta Absoluta population
105	Khadija Zabour, M'Barek Feddaoui, Hicham Meftah and Mohamed Hissouf	Numerical investigation on the effect of water mass in solar still integrated to heat exchanger
114	Driss Saadaoui, Mustapha Elyaqouti, Khalid Assalaou, Dris Ben Hmamou, Souad Lidaighbi, El Hanafi Arjidal and Imade Choulli	Parameter extraction of a single-diode photovoltaic model using the differential evolution (DE) algorithm
121	Souad Touairi, El Mehdi El Bahloul, Mustapha Adar and Mustapha Mabrouki	Maximum Power Point Tracking Algorithms of a Piezoelectric Energy Harvester Under Forced Excitation
124	Mohammed Daoudi	Analysis of wind energy practice in greenhouses: Case Study
130	Naoufel Khaldi, Youssef Barradi and Hanafi Arjidal	Synthèse et mise en œuvre d'une stratégie de commande adrc pour un système éolien
131	Khalid Mrigua, Mounia Zemamou and Mohammed Aggour	Numerical assessment of a new blade multi-stage Savonius Rotors
134	Said Amounas, Abdellah Hbab, Hassan Chaïb, Thami Ait-Taleb and Abdelhakim Nafidi	Theoretical Study of Structural, Electronic, Electric and Optical Properties of PbTiO <sub>3</sub> using DFT-LDA Approach

<b>Session 4</b>	<b>Track : Heat and mass transfer &amp; Fluid mechanics Tuesday, 22 March 2022 (GMT+1) 16h15-18h30</b>	
Moderators	Moderator : Lahcen Boukhattem, ENSA Safi, UCA, Morocco Co-Moderator: Mohamed Sammouda, FP Béni Mellal, USMS, Morocco Co-Moderator: Salah Er-raki, FST Marrakech, Morocco Co-Moderator: Mohamed Zidane, FP Ouarzazate, UIZ- Morocco	
Zoom Link	<a href="https://us05web.zoom.us/j/81427204403?pwd=YmdvN2V3V3ppdTVzZDdrV084b0p0Zz09">https://us05web.zoom.us/j/81427204403?pwd=YmdvN2V3V3ppdTVzZDdrV084b0p0Zz09</a>	
ID paper	Authors	Title
33	Mohamed Madi, Khalid Souhar, Abdessamade Rafiki and Seyed Mohammad Taghavi	The Combined Effects On Channel Amplitude And Fluid Elasticity Of Viscoelastic Fluid Flow Through a Periodic Channel.
36	Wadi Amlal, Anass Bendaraa, Mohamed Elörch, Mohamed Harchaoui and Moulay Mustapha Charafi	Inclination and Volume Fraction Effect on A Convective Flow of Nanofluid: ADI Methods.
38	Fatima Ezzahra Allali, Hassan Demrati, Ahmed Aharoune, Lahoucine Gourdo, Younes Errami, Lahcen Bouirden and Ahmed Wifaya	Comparative study of the energy behaviour of two agricultural greenhouses (canarian and mono-span) under semi-arid climate.
39	Mohamed Elörch, Anass Bendaraa, Wadi Amlal, Mohamed Harchaoui and Moulay Mustapha Charafi	The Effect Of Coupling Radiation-Natural Convection Inside Square Cavity Filled With Air : Numerical Study.

45	Youssef Tizakast, Mourad Kaddiri and Mohamed Lamsaadi	Double-Diffusive Mixed Convection in a Shallow Rectangular Cavity with Double Lid-Driven Boundaries Filled with Newtonian Fluid.
46	Youssef Tizakast, Mourad Kaddiri and Mohamed Lamsaadi	Buoyancy Ratio Effect on Double-Diffusive Mixed Convection in a Double Lid-Driven Rectangular Cavity Filled with Newtonian fluid.
47	Amine El Harfouf, Sanaa Hayani Mounir and Abderrahim Wakif	flow and Heat transfer analysis of a nanofluid between two parallel plates in the existence of constant magnetic field with Christov- Cattaneo heat flux.
49	Hind Sarghini, Abdelhamid Khabbazi, Sara Ibn-Elhaj and Sara Ladouy	Improvement of a seawater desalination system by humidification and dehumidification using a solar heat pump.
50	Oumaima El Ajouri and Bousseham Kharbouch	Two Dimensional CFD Modelling of GELDART B Particles in A Thin Bubbling Fluidized Bed: Comparison of Homogeneous Drag Models.
57	Mira Ouhroum, Anass Bendaraa and Marouan Nouni	Numerical study of Forced convection in a driven cavity filled with nanofluids with Many Dispositions Of Obstacles By Lattice Boltzmann method.

<b>Session 5</b>	<b>Track : Environment-friendly thermal systems Tuesday, 22 March 2022 (GMT+1) 16h15-18h30</b>	
<b>Moderators</b>	Moderator: Salah Er-Raki, FST UCAM-Morocco Co-Moderator: Jamal Ezzahar, ENAS Safi, UCA-Morocco Co-Moderator: Mohamed Ouzzane, Almadinah University, Saudi Arabia Co-Moderator: Abdelhadi Kotri, FP Ouarzazate, UIZ- Morocco	
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<b>ID paper</b>	<b>Authors</b>	<b>Title</b>
1	Patrick Akpan	Fleetwide CO2 emissions of power system networks with renewable power penetration.
41	Abdeslam Aitelmaki, Mohamed Karim Benhachemi and Jamal Alibou	Optimization of Monitoring Sensor Placement of Water Quality in the Water Distribution System using EPANET and TEVA-SPOT: Case Study of Casablanca (Morocco).
48	Abdelkader Lahlali, Zakaria El Maskaoui, Lahbib Boushine and Sara Borji	Nouveau concept d'un navire dépollueur autonome et multi- missions avec optimisation de son bulbe d'étrave.
53	Mehdi Lakhssassi, Hassan Darhmaoui and Naeem Nisar Sheikh	Load forecast based district energy equipment sequencing.
67	Mamadou Aliou Ii Diallo, Zaid Romani, Mustapha Mahdaoui, Mohammed Ahachad and Fatima Bahraoui	Évaluation des besoins énergétiques et du confort thermique dans les cases traditionnelles et modernes sous le climat tropical de la Guinée.
96	Abdessamad El Hassnaoui, Lahcen Boukhattem, Fatima Zahra Benaddi, Fatima Ait Nouh, Siham Sakami and Brahim Benhamou	Etude des performances énergétiques d'une technique passive de rafraichissement appliquée sur la toiture d'une cellule-test dans le climat de Marrakech.
99	Zakaria Tagnamas, Younes Bahammou, Hamza Lamsyehe, Mounir Kouhila, Ali	Analysis of White Truffle (Terfazia Boudieri) Drying Using an Experimental Approach Based



	Idlimam and Abdelkader Lamharrar	On a Microwave Drier.
113	Ahmed Bouchaala, Ossama Merroun, Amine Mikdam and Anas Sakim	A direct desiccant evaporative cooling system optimization.
35	Mustapha Malha, Said Kardellass, Oumayma Cherqi and Oumayma El Moussaoui	Design and implementation of emissive and reflective materials based on silicon and titanium dioxides (SiO <sub>2</sub> / TiO <sub>2</sub> )

Session 6	<b>Track : Heat and mass transfer &amp; Fluid mechanics Tuesday, 22 March 2022 (GMT+1) 16h15-18h30</b>
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Moderators	Moderator: Mustapha El Alami, FSAC, Casablanca, UH2, Morocco Co-Moderator: Mohamed Hssikou, FS Agadir, UIZ-Morocco Co-Moderator: Abdelkhalek Cheddadi, EMI, UM5-Morocco Co-Moderator: Brahim Boughazi, FP Ouarzazate, UIZ-Morocco
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ID paper	Authors	Title
2	Sara Borji, Mohammed Benzirar and Abdelkader Lahlali	Numerical simulation of the diffusion coefficient in a heated turbulent medium using a Markov process
3	Radouan Boukharfane and Saad Benjelloun	A Level-Set Immersed Boundary Method For Simulating Flows Around Cylinders In Tandem And Side-By-Side Arrangements
61	Hiba Elbassiti, Maryam Adwan, Hassane Darhmaoui and Naeem Sheikh	Numerical Investigation of Heat Transfer Enhancement in a Parabolic Trough Receiver Using Triangular Fins.
63	Ahmed El Hamri, Fatima Bahraoui, Mustapha Mahdaoui, Xavier Chesneau and Belkacem Zeghmati	Investigation of the Geometrical Effect of Two Solid Partitions on the Natural Convection in a Cavity.
66	Khadija Ezzaraa, Ahmed Bahlaoui, Ismail Arroub, Abdelghani Raji and Mohammed Hasnaoui	Modeling of Mixed Convection and Thermal Radiation in a Rectangular Enclosure Submitted to Different Ventilation Modes.
68	El Mehdi Berra, Mustapha Faraji, Ayman Benkaddour and Kenza Oudaoui	Numerical simulation with LBM of Natural convection in a square cavity heated from below intended for cooling an electronic component.
73	Kamal El Marrakchi and Mohamed Lamsaadi	Ecoulement d'un fluide de bingham dans une cavite horizontale.
75	Khadija Bihiche and Mohamed Lamsaadi	Soret Driven Thermosolutal Convection of Power-law Fluids in a Shallow Cavity Uniformly Heated from Below: Case of Cooperating Flows.
77	Abdelhak Daiz, Ahmed Bahlaoui, Ismail Arroub, Soufiane Belhouideg, Slimane Ousemrar, Abdelghani Raji and Mohammed Hasnaoui	Modeling of Nanofluid Mixed Convection within Discretely Heated Lid-Driven Inclined Cavity Using Lattice Boltzmann Method.
78	Anass Bendaraa, Mohamed Harchaoui, Mohamed Elörch, Wadi Amlal, Mly Mustapha Charafi and Abdellatif Hasnaoui	Optimisation of Double Pipe Heat Exchanger Using Al <sub>2</sub> O <sub>3</sub> -Cu Hybrid Nanofluid.
81	Redouane Nouri, Mourad Kaddiri, Youssef Tizakast and Hamza Daghab	Numerical Study of Free Convection in Square Cavities Filled with Non-Newtonian Fluids and Subjected to Partial Cross Thermal Gradients.

Session 7			<b>Track : Energy efficiency and artificial intelligence Wednesday, 23 March 2022 (GMT+1) 11h15-12h45</b>		
Moderators			Moderator: Hassane Darhmaoui, Al Akhawayn University, Ifrane, Morocco Co-Moderator: Abdeslam Draoui, FST Tanger, UAE, Morocco Co-Moderator: Soufiane Oukach, EST Guelmim, UIZ, Morocco		
Zoom Link			<a href="https://us05web.zoom.us/j/81427204403?pwd=YmdvN2VVCV3ppdTVZcDdrV084b0p0Zz09">https://us05web.zoom.us/j/81427204403?pwd=YmdvN2VVCV3ppdTVZcDdrV084b0p0Zz09</a>		
ID paper	Authors	Title			
28	Ismail Arroub, Ahmed Bahlaoui and Soufiane Belhouideg	Efficiency Assessment of an Earth-Air Heat Exchanger System on Buildings Energy Demand.			
43	Jabeur Reda, Mohamed Saidi Hassani Alaoui and Najat Ouaaline	A case study of how to improve the exhibition hall's dynamic performance in a Moroccan building in Fez.			
51	Amina Mourid, Mustapha El Alami, Rachid Saadani and Miloud Rahmoun	Thermal characterization of plastic waste for their recovery and use in the thermal insulation of the building.			
79	Fatima Zahra Benaddi, Lahcen Boukhattem, Brahim Benhamou and Fatima Ait Nouh	Life Cycle Cost Minimization Through Optimization Of Building Envelope Insulation Under Moroccan Climatic Context.			

Session 8			<b>Track : Energy efficiency and artificial intelligence Wednesday, 23 March 2022 (GMT+1) 11h15-12h45</b>		
Moderators			Moderator: Rachida Idchabani, Ecole Nationale Supérieure des Mines-Rabat-Morocco Co-Moderator: Nelson Martins, University of Aveiro, Portugal Co-Moderator: Mourad Kaddir, FST Beni Mellal, USMS, Morocco		
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ID paper	Authors	Title			
109	Zahra Najam and Mostafa Najam	Etude expérimentale du comportement passif d'un local munie de mur à double parois contenant du mcp au sein de la lame d'air du mur sud et ouest.			
111	Rim Afa and Issam Sobhy	Impact of AI Integration on Energy Efficiency Retrofits of Residential Buildings.			
115	Manal Ach-Chakhar, Adnane M'Saouri El Bat, Benoît Michel, Frédéric Kuznik and Abdeslam Draoui	Modeling of a Thermochemical Heat Storage System for Buildings.			
126	Fatima-Zahra El-Bichri, Issam Sobhy, Imane Bouchefra, Brahim Benhamou, Hassan Chehouani and Mohamed Oualid Mghazli	Assessment of the thermal behavior of two houses built with wood or hemp-earth blocks.			

Session 9			<b>Track : Phase change materials and energy storage Wednesday, 23 March 2022 (GMT+1) 11h15-12h45</b>		
Moderators			Moderator: Khadija Choukairy, ENSA Khouribga, Morocco Co-Moderator: Hassan Chehouani, FST Marrakech, UCA, Morocco Co-Moderator: Rachid Masrour, ENSA Safi, UCA, Morocco		
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ID paper	Authors	Title			
86	Mustapha Ait Boukideur, Najim Selhaoui, Fatima Zahra Chrifi Alaoui, Hamza Bouchta and Omar Ennaya	Thermodynamic assessment of Gallium-Molybdenum binary system.			



88	Khadija Achgar, Lahoucine Gourdo, Bouchta Hamza, Mustapha Ait Boukideur, Fz Chrifi Alaoui, Najim Selhaoui and Ahmed Aharoune	Thermodynamic assessment of the thulium-copper-germanium ternary system.
116	Oumaima Imghoure, Salma Ouhaibi, Naoual Belouaggadia, Mohammed Ezzine, Rachid Lbibb and Zohir Younsi	Modélisation numérique du comportement thermique d'une paroi munie des matériaux à changement de phase.
118	Fatima Redoine and Naoual Belouaggadia	Modélisation de stockage et déstockage de chaleur dans les matériaux à changement de phase à haute température application csp
132	Oumayma Babaharra, Khadija Choukairy and Hamza Faraji	Microencapsulation of Phase Change Materials in a building roof.

Session 10		
Track : Thermal and acoustic characterization of local building materials Wednesday, 23 March 2022 (GMT+1) 14h00-16h15		
Moderators	Moderator: Amel Soukaina Cherif, ENAU, Université de Carthage, Tunisie Co-Moderator: Faouzi Lakrad, University Hassan II Casablanca-Morocco Co-Moderator: Saadani Rachid, EST Meknes, UMI, Morocco Co-Moderator: Ahmed Fadili, FP Ouarzazate, UIZ- Morocco	
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ID paper	Authors	Title
11	Walid Abouloifa, Mohammed Ettaki, Said Sghir and Sanaa Hayani Mounir	Physicochemical characterization and thermal behavior of clays from Settat area and their potential use in construction field.
23	Mohamed Touil, Amine Lachheb, Rachid Saadani, Adil Charef, Abdellah Talidi and Miloud Rahmoune	An Experimental Investigation of the Blending Water Rate Effect on the Plaster Thermo-Mechanical Properties.
25	Laktaoui Amine Fatima Zahra	Bibliographic study and state of the art on data center cooling.
54	Rabab Raghieb, Hassna Khalfi, Ismail Naciri, Abdellah Benami, Jiangong Yu, Lahoucine Elmaimouni and Youssef Belkassmi	Guided Wave Characteristics in Anisotropic Cylindrical Structure.
55	Hassna Khalfi, Rabab Raghieb, Ismail Naciri, Lahoucine Elmaimouni, Jeannot Falimiamanana, Faniry Ratolojanahary, Jiangong Yu and Abdellah Benami	3-D Modeling of Hollow Cylinder Piezoelectric Resonator by Polynomial Approach.
76	Abdellah Mellaikhafi, Amine Tilioua and Abderrahim Benallel	Valuation of a thermal insulation made of cardboard reinforced with Alfa plant fibers.
82	Atbir Aziza	Valuation of sheep's wool for thermal insulation: A review.
83	Abderrahim Benallel, Amine Tilioua, Abdellah Mellaikhafi, Mohammed Garoum and Moulay Ahmed Alaoui Hamdi	Thermal And Acoustic Characterization Of Thermal Insulation Materials Based On Local Plant Fibers.
90	Younes Bahammou, Mounir Kouhila, Zakaria Tagnamas, Hamza Lamsyehe, Abdelkader Lamharrar and Ali Idlimam	Adsorption/desorption characteristics of clay reinforced with Chamarrops humilis fiber's.

Session 11		<b>Track : Phase change materials and energy storage Wednesday, 23 March 2022 (GMT+1) 14h00-16h15</b>	
Moderators	Moderator: Abdelhamid Kheiri, Université de Lorraine LEMTA UMR CNRS-France Co-Moderator: Ayoub Gounni, FSAC Casablanca, UH2, Morocco Co-Moderator: Lahcen Bammou, FS Agadir, UIZ, Morocco Co-Moderator: Hassan Chaib, FP Ouarzazate, UIZ- Morocco		
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ID paper	Authors	Title	
12	Hamza Faraji, Adeel Arshad, Mustapha El Alami, Ahmed Aamouche, Khadija Choukairy and Elalami Semma	PCMs and hybrid nanoparticles based thermal management strategy for cooling electronic components.	
37	Mohamed Harchaoui, Anass Bendaraa, Mohamed Elörch, Wadi Amlal and Moulay Mustapha Charafi	Effect Of Tubes Added To Heat Exchanger: Heat Transfer And Energy Storage Improvement On Phase Change Material.	
52	Manal Hariss, Ayoub Gounni and Mustapha El Alami	Phase Change Behavior of PCM Inside a Rectangular Enclosure Partially Filled with Honeycomb Structure.	
58	Ayman Benkaddour, Faraji Mustapha, Kenza Oudaoui and El Mehdi Berra	Phase Change Material Melting Temperature influence analysis integrated in a building concrete wall coupled with a solar collector.	
59	Mohamed El Aabbas, Mohammed Ahachad, Mustapha Ouardouz and Mustapha Mahdaoui	Optimization Study of Phase Change Material in Building Hollow Bricks: Numerical Analysis.	
62	Ayoub Briache, Ayoub Afass, Mustapha Ouardouz, Mohammed Ahachad and Mustapha Mahdaoui	Thermal Performance Improvement of a Heat Sink Using Phase Change Materials and Fins.	
69	Boulgana Meriam	Description du système germanium-strontium.	
80	Abderrahmane El Hanafi, Nicolas Blet, Abdelhamid Kheiri and Benjamin Remy	Numerical investigation of a TES with PCM under periodic boundary conditions.	
84	Fatimaezzahra Kerkoubi, Fatima Zahra Chrif Alaoui, Mohammed Idbenali, Kamal Mahdouk, Najim Selhaoui, Mustapha Ait Boukideur, and Khadija Achgar	Description of the Lu-In system.	
71	Omar Ennaya, Mohamed Idbenali, Najim Selhaoui, Kamal Mahdouk and Fatim Zahra Chrif Alaoui	Thermodynamic assesement of the NaBr–RbBr binary system	

Session 12		<b>Track : Heat and mass transfer &amp; Fluid mechanics Wednesday, 23 March 2022 (GMT+1) 14h00-16h15</b>	
Moderators	Moderator: Mbarek Feddaoui, ENSA Agadir, UIZ, Morocco Co-Moderator: Mustapha Faraji, FSAC Casablanca, UH2, Morocco Co-Moderator: Said Yadir, ENSA Safi, UCA, Morocco Co-Moderator: Adil Charef, ENSA Agadir, UIZ, Morocco		
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ID paper	Authors	Title	
85	Imene Bouchelkia, M'Barek Feddaoui, Youb Khaled Benkahla and Nabila Labsi	Numerical Study of a Dry Air Heating by Evaporating a Binary Water-Glycol Liquid Film Along a Vertical Channel.	
97	Youness Foukhari, Mohamed Sammouda,	Heat Transfer by Natural Convection in an	

	Mohamed Driouich and Kamal Gueraoui	Annular Space Partially Porous Layered and Saturated by a Nanofluid.
98	Hicham Darnif, Essaadia Azelmad and Lahbib Boushine	Modélisation Expérimentale et Numérique de la résistance au feu d'un mur en agglos non porteur - Mur en situation d'incendie.
102	Amine Akka, Farid Benabdelouahab and Randa Yerrou	Nanosatellite On-Low-Earth-Orbit Temperature Simulation and its Implication Concerning Extreme Cases.
112	Hamza Daghab, Mourad Kaddiri, Mohamed Lamsaadi, Ismail Arroub and Ilham Erritali	Natural Convection of Fluids with Temperature-Dependent Viscosity in a partially heated Square Enclosure's side.
117	Hafid El Kharaz, Kaoutar Khallaki, Moulay Saddik Kadiri and Khadija Choukairy	A numerical analysis of flow in a free convection channel attached behind PV panel: Comparative study.
119	Hamza Daghab, Mourad Kaddiri, Ismail Arroub, Ilham Erritali and Redouane Nouri	Natural Convection for Fluids with Temperature-Dependent Viscosity in a Square cavity subjected to discrete heating from below.
122	Mohamed Hesayn and Bousshine Lahbib	Etude du Comportement Thermomécanique des Profilés Métalliques Avec ou Sans Isolation, Application A la Flexion des Poutres HEB300.
127	Adil Charef, M'Barek Feddaoui, Monssif Najim, Rachid Saadani, Miloud Rahmoune and Mohamed Hissouf	Numerical analysis of seawater liquid film evaporation.
128	Anas El Amraoui, Sara Touzani, Abdelkhalek Cheddadi and Mohammed Touhami Ouazzani	Fins Height Impact on Heat Transfer and Fluid Flow in a Finned Cylindrical Annular Cavity.

<b>Session 13</b>	<b>Track : Thermal systems and combustion Wednesday, 23 March 2022 (GMT+1) 16h15-17h30</b>	
<b>Moderators</b>	Moderator: Ahmed Meskini, ENSEM, Casablanca, UH2, Morocco Co-Moderator: Abdelhak Khourchafi, ENSEM Casablanca, UH2, Morocco Co-Moderator: Issam Sobhy, ENA of Marrakech, Morocco Co-Moderator: Rabia Riad, FP Ouarzazate, UIZ- Morocco	
<b>Zoom Link</b>	<a href="https://us05web.zoom.us/j/81427204403?pwd=YmdvN2VVCV3ppdTVZcDdrV084b0p0Zz09">https://us05web.zoom.us/j/81427204403?pwd=YmdvN2VVCV3ppdTVZcDdrV084b0p0Zz09</a>	
<b>ID paper</b>	<b>Authors</b>	<b>Title</b>
34	Amal Igaadi, Rachid El Amraoui and Hicham El Mghari	Computational study of effects of gravity levels and orientation on subcooled flow boiling in a minichannel.
60	Oumaima Fellaji, Zaid Romani, Mustapha Mahdaoui and Mohammed Ahachad	Impact of interior insulation on the safety of people in case of fire - Case study of an office building.
65	Omar Ouabouch, Imad Ait Laasri, Mounir Kriraa and Mohamed Lamsaadi	Effect of various shapes for nanoparticles on the performance of a parabolic trough solar collector using CuO/ water nanofluid.
106	Brady Axel Manescau, Khaled Chetehouna, Nives De Francesco and Walid Siyoucef	Experimental investigation of the effect of equivalence ratio on the characteristics of a kerosene/air diffusion flame.
107	Ludovic Lamoot, Brady Axel Manescau, Khaled Chetehouna and Nicolas Gascoin	Effect of injector size on the spray characteristics: preliminary experimental work on the effect of the cavitation.

Session 14			<b>Track : Measurements techniques in thermal sciences Wednesday, 23 March 2022 (GMT+1) 16h15-17h30</b>		
Moderators			Moderator: Mounir Kriraa, ENSA Safi, UCA, Morocco Co-Moderator: Nabila Ihaddadene, Université de M'Sila, Algeria Co-Moderator: Saury Didier, University of Poitiers, France Co-Moderator: Youssef Haddout, FP Ouarzazate, UIZ- Morocco		
Zoom Link			<a href="https://us05web.zoom.us/j/88364631594?pwd=VjhzaI9VUmhrdIU1Wk5ySDlrSVo1UT09">https://us05web.zoom.us/j/88364631594?pwd=VjhzaI9VUmhrdIU1Wk5ySDlrSVo1UT09</a>		
ID paper	Authors	Title			
21	Mohamed Chouidira, Nabila Ihaddadene, Razika Ihaddadene and Reda Khama	Effet de l'utilisation de la laine de mouton comme isolant sur les échanges thermiques entre l'enveloppe de la maison et son milieu environnant.			
24	Faycal Taghlabi and Laila Stour and Hajar Moukhchani	Tools for reducing non-revenue water in the water distribution networks. a case study for the city of Casablanca (Morocco).			
108	Fatima Gugouch, Achraf Wahid, Abdeslam Tizliouine, Mohammed Barakat and Mohamed Elghorba	Thermal and Mechanical Characterization of Chlorinated Poly (Vinyl Chloride).			
110	Mohamed Abouelmajd, Ahmed Bahlaoui, Ismail Arroub, Issam El Khadiri, Ismail Chiguer, Youssef Najm-Eddin, Asmae Najm-Eddin, Maria Zenzami, Nabil Hmina, Manuel Lagache and Soufiane Belhouideg	Assessing the Effect of 3D Printing Temperature on Polymer Materials Behavior and its Interaction with other Parameters.			
129	Imane Bouchefra, Fatima Zahra El Bichri, Hassan Chehouani and Brahim Benhamou	Experimental study of different stabilizers effect on the compressed earth brick thermal conductivity.			
32	Taha Yassine Rhabi, Mohamed Taha, Elhanafi Arjdal and Benhmamou Dris	Measurements techniques in thermal sciences			

Session 15			<b>Track : Thermal and acoustic characterization of local building materials Wednesday, 23 March 2022 (GMT+1) 16h15-17h30</b>		
Moderators			Moderator: Abdellah Benami, FST Errachidia, UMI, Morocco Co-Moderator: Khalid Souhar, FS Agadir, UIZ, Morocco Co-Moderator: Razika Ihaddadene, Université de M'Sila, Algeria Co-Moderator: Sahal Mustapha, FP Ouarzazate, UIZ, Morocco		
Zoom Link			<a href="https://us05web.zoom.us/j/83105280767?pwd=YkU4Ui9BeVhoTW1KQVEyVVJMTjZzd09">https://us05web.zoom.us/j/83105280767?pwd=YkU4Ui9BeVhoTW1KQVEyVVJMTjZzd09</a>		
ID paper	Authors	Title			
101	Rabab Raghieb, Hassna Khalfi, Ismail Naciri, Lahoucine Elmaimouni, Jiangong Yu, Youssef Belkassmi and Lahcen El Maimouni	Effects of Graded-Index on Guided Wave Propagation in a Multilayer Functionally Graded Cylinder			
104	Ismail Chiguer, Ahmed Bahlaoui, Ismail Arroub, Mohamed Abouelmajd, Youssef Najm-Eddin, Asmae Najm-Eddin and Soufiane Belhouideg	Micromechanical Models for Predicting the Thermal Conductivity Properties of Construction Materials: A Comparison with Experimental Data			
120	Salma Ouhaibi, Oumaima Imghoure, Naoual Belouaggadia, Mohammed Ezzine and Rachid Lbibb	Étude d'un enduit écologique à base d'aérosol adapte à l'isolation thermique.			
123	Abalouch Ibtissam, Sakami Siham,	Thermo-mechanical characterization of concrete			

	Elabbassi Fatima-Ezzahra Elabbassi and Boukhattem Lahcen	incorporating recycled tire rubber
125	Siham Sakami, Fatima-Ezzahra Elabbassi and Lahcen Boukhattem	Effect of thermal fatigue on compressive strength and ultrasonic pulse velocity of rubber-based composite

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