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**CIFMA 2018**



**CIFMA**



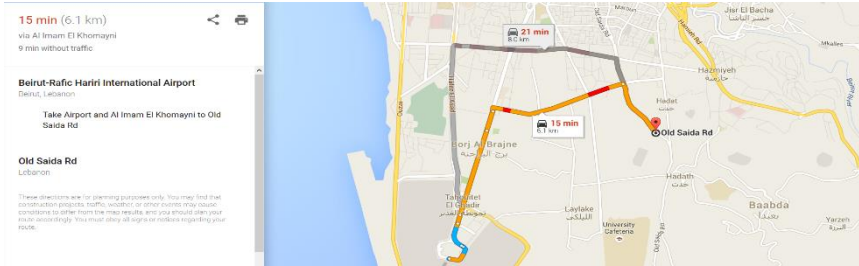
**5ième Congrès International Francophone de  
Mécanique Avancée  
(CIFMA 2018)**

**The Fifth International Francophone Congress of  
Advanced Mechanics  
(IFCAM 2018)**

**October 31 – November 2, 2018**

**Faculty of Engineering - Lebanese University  
Rafic Hariri Campus - Hadath  
Beirut - Lebanon**

**Nearest Airport**  
Beirut-Rafic Hariri International Airport



**Host Country**  
Lebanon

**Participating Countries (10)**

Algeria, Canada, France, Iran, Lebanon, Romania, Saudi Arabia, Senegal, Sweden, Tunisia

**Note:**

The time of each presentation including questions is 15 minutes.

**Schedule of the Conference**

Date	Time	Activity
<b>October 31 2018 (Wednesday)</b>	8:30 am – 9:15 am	<b>Registration</b>
	9:15 am – 10:00 am	<b>CIFMA Opening Ceremony</b>
	10:00 am – 10:15 am	<b>Coffee Break</b>
	10:15 am – 11:00 am	Keynote Presentation by: <b>Prof. Mahmood M. SHOKRIEH</b>
	11:00 am – 1:00 pm	<b>Session 1</b> <u>ID: 8 / 15 / 31 / 35 / 27 / 20 / 26</u>
	1:00 pm – 2:00 pm	<b>Lunch Break</b>
	2:00 pm – 2:45 pm	Keynote Presentation by: <b>Prof. Rafic YOUNES</b>
	2:45 pm – 3:45 pm	<b>Session 2</b> Room A: <u>ID: 17 / 33 / 24</u> Room B: <u>ID: 9 / 10 / 17</u>
	3:45 pm – 4:00 pm	<b>Coffee Break</b>
	4:00 pm – 5:00 pm	<b>Session 3</b> Room A: <u>ID: 21 / 32 / 19</u> Room B: <u>ID: 11 / 12 / 5</u>
	8:00 pm – 11:00 pm	<b>GALA Dinner</b>
<b>November 1, 2018 (Thursday)</b>	8:30 am – 9:00 am	<b>Registration</b>
	9:00 am – 10:00 am	<b>Session 4</b> <u>ID: 1 / 6 / 34</u>
	10:00 am – 10:15 am	<b>Coffee Break</b>
	10h15 am – 12h15 am	<b>Session 5</b> <u>ID: 3 / 18 / 25 / 28 / 29 / 30 / 16</u>
	12:15 am – 1:00 pm	Keynote Presentation by: <b>Prof. Aouni LAKIS</b>
	1:00 pm – 2:00 pm	<b>Lunch Break</b>
	2:00 pm – 2:45 pm	Keynote Presentation by: <b>Prof. Abdelkhalak EL HAMI</b>
	2:45 pm – 3:45 pm	<b>Session 6</b> <u>ID: 2 / 23 / 22</u>
3:45 pm – 4:00 pm	<b>Closing Ceremony</b>	
<b>November 2 (Friday)</b>	8:00 am – 12:00 pm	<b>Tour</b>

## DETAILED PROGRAM

October 31, 2018 (Wednesday)

Time	8:30 am – 9:15 am
Title	<b>Registration</b>

Time	9:15 am – 10:00 am
Title	<b>Opening Ceremony</b>

Time	10:00 am – 10:15 am
Title	<b>Coffee Break</b>

Time	10:15 am – 11:00 am
Title	<b>Keynote Presentation</b>

Chair	Jihad Sahili
Speaker	 <b>Prof. Mahmood M. SHOKRIEH</b>

### Biography

- Education
  - Ph.D., Mechanical Engineering Department, McGill University, (1995).
  - M. Eng., Mechanical Engineering Department, McGill University, (Jan. 1991).
  - B.Sc., School of Mechanical Engineering, Iran University of Science and Technology, (1984).
- Working Experience
  - Professor, Iran University of Science and Technology, (1996-now).
  - General Secretary of Advanced Materials and Manufacturing Council, (2015-Now).
  - Member of Professors Promotion Committee of Iran University of Science and Technology, (2014-now).
  - Member of Professors Recruitment Committee of Iran University of Science and Technology, (2004-now).
  - Member of Trustee Council of Technology Studies Research Center, (2013-now).
  - President of Iran Scientific Composites Association, (2012-now)
  - Member of Coordination Commission of Science, Research and Technology Council, (2010now).
  - Director of Composite Materials and Technology Center, (2009-now)
  - Member of Professors Promotion Committee of Semnan University, (2007-2009).
  - Scientific Consultant of Presidency Technology Cooperation Office, (1996-Now).

- Recent Awards
  - Composites and Nanocomposites Materials and Structures research Chair Awards, Iranian National Science Foundation, 2018.
  - Distinguished Professor, Academy of Sciences of Iran, 2018.
  - The Scientist with a World Ranking of 1 Percent, Thompson Reuters, 2017.
  - Distinguished Professor of Iran University of Science and Technology, 2016.
- Establishment and Membership of Associations
  - Founder of Iran Composites Scientific Association, 2010.
  - Founder of Iran Composites Industrial Association, 2003.
  - President of Iran Composites Association, from 2004 to 2009.
  - Founder of Iran Inventors Association, 2002.
  - Founder of Iran Association Management of Technology, 2004.
  - Member of Composite Fabricator Association, (CFA), from 2004.
  - Member of International Institute for FRP in Construction, (IIFC), From 2004.

#### Presentation Title

### RECENT RESEARCH ACTIVITIES OF: composites research laboratory (CRL)

#### Abstract

In this presentation, Professor Mahmood M. Shokrieh will present the recent research activities of composites research laboratory (CRL) of Iran University of Science and Technology (IUST) in the field of composites and nanocomposites. The historical background of IUST and a brief introduction of composites research laboratory will be presented first. Furthermore, six different active research topics of CRL will be discussed. The topics are as follows.

- Residual stresses in laminated composites and hybrid nanocomposites,
- Fatigue of composites and hybrid nanocomposites,
- Fracture mechanics of composites and hybrid nanocomposites,
- High strain rate behavior of composites and hybrid nanocomposites,
- Modeling of nanocomposites,
- Self-healing of polymer matrix composites reinforced with shape memory alloy.


A general explanation of each topic followed by the results and discussions will be presented. The results show promising enhancements of mechanical behaviors of traditional composites by adding nanoparticles. Some research challenges in this research area will be discussed. A comprehensive research in these fields is under progress in CRL. The results of these researches have been published in various international journals. More details of each topic can be found in the published papers by CRL, and can be discussed after the presentation.

Time	11:00 am – 13:00 pm
Title	Session 1: Room A

Chairs	Oussama IBRAHIM & Hassan SHREIM
<b><i>Power and Thermal Process Systems</i></b>	
8- Convection mixte MHD d'un nanofluide (eau-Cu) dans une cavité ouverte ( <i>Brahim Fersadou</i> )	
15- Etude d'un jet de ferrofluide confiné en présence de deux sources magnétiques ( <i>Kahalerras Henda</i> )	
31- Modeling of a Pyrolysis Batch Reactor Using COMSOL Multiphysics ( <i>Youssef Abou Msallem</i> )	
<b><i>Robotics, Automation, and Measurements</i></b>	
35- New approach for gas identification using supervised learning methods (SVM and LVQ), ( <i>Rafic Younes</i> )	
27- Recalage de la navigation inertielle hybride par le filtrage de Kalman sans parfum paramétré à quaternions ( <i>Wassim Khoder</i> )	
20- Adaptive sliding mode control with gravity compensation: Application to an upper-limb exoskeleton system ( <i>Sana Bemblil</i> )	
26- A Novel Combination Method for Image Restoration Based on Bootstrap Filter and DWT ( <i>Bassel Marhaba</i> )	

Time	1:00 pm – 2:00 pm
Title	Lunch Break

Time	2:00 pm – 2:45 pm
Title	Keynote Presentation

Chair	Mahmood M. SHOKRIEH
Speaker	 <p style="text-align: center;"><b>Prof. Rafic YOUNES</b></p>

#### Biography

Enseignant-Chercheur à l'Université libanaise, Faculté de Génie. Doyen de cette Faculté depuis 2011. Vice-Président de la Conférence Internationale des Formations des Ingénieurs et de Techniciens d'Expression Française depuis 2012. Conseiller du Recteur de l'Université Libanaise en assurance qualité et accréditation depuis 2010.

Auteur de 183 diverses publications dont 76 Journaux et 07 Chapitres. Membre de 2 Jury HDR. 19 Jury de thèses de Doctorat et 15 projets de recherche internationaux. Cotuteur de 27 thèses de doctorat dont 6 en cours. 36 mobilités et séjours dans diverses Universités françaises et Universités canadiennes.

#### Titre de la Présentation

**Optimisation et contrôle non linéaire :  
apports théoriques et applications diverses**

#### Résumé

Le fil conducteur de mes recherches est l'optimisation non linéaire ainsi que le contrôle non linéaire. Quelques apports théoriques ont été fondés. Plusieurs applications en ingénierie multidisciplinaire ont été réalisées. A titre d'exemple : gestion de l'énergie, homogénéisation, détection et diagnostic, estimation des paramètres techniques.

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Time	2:45 pm – 3:45 pm
Title	Session 2: Room A

Chairs	Pierre Rahme & Christophe Varnier
<b><i>Design, Reliability, and Optimization</i></b>	
17- Optimisation fiabiliste d'une structure en alliage à mémoire de forme ( <i>Abdelkhalak El-Hamî</i> )	
33- Caractérisations mécaniques des charnières pour meuble ( <i>Mohamad Ali</i> )	
24- Reduction of Disc Brake Fading Using Both Design and Material Optimization ( <i>Mervat Madi; Jad Kalaaji</i> )	

Time	2:45 pm – 3:45 pm
Title	Session 2: Room B

Chairs	Gilbert Accary & Fatima Zohra Bakhti
<b><i>Flows, Transport Phenomena, and Interactions</i></b>	
9- Experimental investigation of the correlation between the dynamic of a jet impinging on a slotted plate and the acoustic field generated ( <i>Marwan Al kheir</i> )	
10- Tomographic and Time-Resolved PIV measurement of an Impinging Jet on a Slotted Plate ( <i>Jana Hamdi</i> )	
7- Intensification des échanges de chaleur dans les dissipateurs de microordinateurs ( <i>Abdelkader Aris</i> )	

Time	3:45 pm – 4:00 pm
Title	<b>Coffee Break</b>

Time	4:00 pm – 5:00 pm
Title	Session 3: Room A

Chairs	Mervat Madi & Mohamad Ali
<b><i>Design, Reliability, and Optimization</i></b>	
21- Remaining useful life prediction for ball bearings based on health indicators ( <i>Zeina Al Masry</i> )	
32- Bayesian updating for uncertain condition state using permanent monitoring and sequential inspections ( <i>Christelle Geara</i> )	
19- Designing and optimisation the concept of a passenger train storage system ( <i>Marilena Stoica</i> )	

Time	4:00 pm – 5:00 pm
Title	Session 3: Room B

Chairs	Hassan Assoum & Abdelkader Aris
<b><i>Flows, Transport Phenomena, and Interactions</i></b>	
11- Experimental analysis of the influence of the impinged plate by an impinging jet on the vortex dynamics using PIV ( <i>Tarek Mrach</i> )	
12- Volumetric Proper Orthogonal Decomposition of an impinging jet using SPIV measurement ( <i>Jana Hamdi</i> )	
5- Simulation numérique d'un écoulement avec transfert de chaleur d'un nanofluide dans un dissipateur de chaleur à ailettes perforées ( <i>Bakhti Fatima zohra</i> )	

Time	20:00 pm – 232:00 pm
Title	<b>GALA Dinner</b>
Address	<b>RAMADA PLAZA</b> Australia Street Raouche Beirut

November 1, 2018 (Thursday)

Time	9:00 am – 10:00 am
Title	Session 4: Room A

Chairs	Jihad Sahili & Chady Ghnatios
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***Flows, Transport Phenomena, and Interactions***

1- Bedform dynamics from coupled bed-flow direct numerical simulations (*Nadim Zgheib*)

***Advanced Materials***

6- Tests d'indentation instrumentée sur granulats de Mâchefers d'Incinération de Déchets Non Dangereux: Influence de la taille de l'indenteur sur le module élastique (*Libasse Sow*)

34- Thermochromic VO<sub>2</sub> films for smart windows application (*Marwan Azzî*)

Time	10:00 am – 10:15 am
Title	Coffee Break

Time	10:15 am – 12:15 pm
Title	Session 5: Room A

Chairs	Jihad Sahili & Marwan Azzi
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***Advanced Materials***

3- Nouvelle méthode de maintenance CBM pour améliorer la durée de vie des pales d'éoliennes implantées dans les zones arides (*Ahmida Rezig*)

18- Erosion Corrosion Behavior of Nanostructure Commercial Pure Titanium in Simulated Body Fluid (*Faramarz Djavanroodi*)

25- Effect of Textile Structure in the Process Parameters of Thermoplastic Bio-composite (*Nawar Kadi*)

28- Modeling the human knee joint using the Proper Generalized Decomposition (*Chady Ghnatios*)

29- Effet de la température de mercerisation sur les propriétés du composite (Jute/Polyester) (*Nafissa Moussaoui*)

30- Etude des mécanismes d'endommagement d'un composite bidirectionnel Jute-Polyester (*Lamia Benhamadouche*)

16- Passenger train storage system using structural materials (*Marilena Stoica*)

Time	12:15 pm – 1:00 pm
Title	Keynote Presentation

Chair	Abdelkhalak EL HAMI
Speaker	 <p>Prof. Aouni LAKIS</p>

### Biography

#### Degrees

- 1971/8 Doctorate, Mechanical Engineering, McGill University
- 1970/8 Master's Thesis, Mechanical Engineering, McGill University
- 1967/1 Bachelor's, Mechanical Engineering, École Polytechnique de Montréal

#### Employment

2007/4 Director of IICAP Mechanical Engineering, IICAP Full-time, Professor  
Tenure Status: Tenure

#### Profile

Research Specialization Keywords: Aeroelasticity, dynamic stability, fluid-structure, numerical methods, plates and shells, Time-frequency, vibration  
Research Disciplines: Mechanical Engineering, Nuclear Engineering  
Areas of Research: Numerical Analysis, Continuum Mechanics, Fluid Mechanics, Noise and Vibration, Mechanical and Physical Processes  
Fields of Application: Energy, Transport.

#### Recognitions

2012/7 NDT&E International Journal  
NDT&E International journal  
Distinction: Your Article(Application of time-frequency analysis for automatic hidden corrosion detection in a multilayer aluminium structure using pulsed eddy current ) is recognised by Science Direct as one of the top 25 papers published in NDT&E International Journal..

### Presentation Title

### Aircraft Design

#### Abstract

##### A) Aeroelasticity of Curved Structures and its applications

Shells of revolution, particularly spherical, cylindrical and conical shells, are one of the basic structural elements in the aerospace structures. With the advent of high speed aircrafts, these shells can show dynamic instabilities when they are exposed to a supersonic flow. Therefore, aeroelastic analysis of these elements is one of the primary design criteria which aeronautical engineers are dealing with. This analysis can be done with the help of finite element method (FEM) coupled with the computational fluid dynamic (CFD) or by experimental methods but it is time consuming and very expensive. The purpose of this dissertation is to present our numerical method developed to do aeroelastic analysis in a fast and precise way.

##### B) Aircraft engines and its applications

Aerospace is Canada's leading advanced technology exporter. In order to maintain its competitive edge in Maintenance, Repair and Overhaul (MRO), the Canadian industry must employ the latest advanced technologies available. The challenge is to develop an intelligent health monitoring system that will adequately address aging aircraft components.

Project Description: The main objective of the project is to develop a comprehensive intelligent method for detecting faults in a multi-component complex system (e.g. aircraft engine). This will be accomplished in 2 phases:

- 1- Decompose the signals into components pertaining to system's components 'source separation' and if the components of the system are not well identified, the method used is called 'blind source separation'.
- 2- Then, signals from the actual state of the components will be compared with the signals in database in order to identify the state of each component. Several artificial intelligent methods will be used for the purpose of comparison and decision-making.

Time	1:00 pm – 2:00 pm
Title	Lunch Break



Time	2:00 pm – 2:45 pm
Title	Keynote Presentation

Chair	Aouni Lakis
Speaker	 <p>Prof. Abdelkhalak EL HAMI</p>

### Biography

Abdelkhalak El Hami, PhD, is a Full Professor at INSA (National Institute of Applied Sciences) of Rouen,- Normandy University, France, as well as Director of Mechanical department of INSA Rouen and Head of mechanical chair of the National Conservatory of Arts and Crafts in Normandy, France. Professor El Hami's research activities include reliability-optimization systems. He is Operator manager INSA Group in Maghreb (Algeria, Morocco and Tunisia)). He has supervised 42 PhD theses. He also is the author and co-author of more than a twenty books and more than 550 papers published in international journals and conferences. He has a doctorate in engineering sciences from the University of Franche-Comté in France (1992). He received his Habilitation diploma to supervise research (HDR) in 2000.

He's Editor in chef of 3 Set of international Book, ISTE, Wiley and Son and Elsvier.

He has award:

1992: Price, Micronora of Piezoelectric actuator

2013: Price, Pepite Noramandy Aerospace

2015: Price, Success story of Moveo, "Pôle de compétitivité international".

### Presentation Title

**Reliability and optimization of embedded mechatronic systems:  
What applications for the automotive and aeronautics industry**

### Abstract

The Reliability-Based Design Optimization (RBDO) in embedded electronics and mechatronical system is a very important part in several industrial fields. The RBDO analysis of industrial systems is a very important engineering issue, in order to guarantee their functional behavior. Most of the critical failures are generated by the interactions between the sub-systems, implemented in different technologies, e.g. mechanics, electronics, and software. Therefore the analysis of the system as a whole is not enough and it is necessary to study all the interactions in order to estimate the system reliability.

In the embedded electronics and mechatronical system design, it is very important to minimize the structural cost and to maximize safety. Few designers (or researchers) can work with these two opposite philosophies. The basic idea is to know the role of each parameter in our design using advanced technologies in CAD (Computer-Aided Design) domain. Our main challenge is to integrate the reliability analysis in the optimization procedure that allows us to define the best compromise between cost and safety. This model is called Reliability-Based Optimization. We applied reliability-based optimization on the three structural optimization families.

Model 1: The Reliability-Based Design Optimization (RBDO) consists of the integration of reliability analysis into the optimization procedure. The classical RBDO approach is carried out in two spaces: normalized space and physical one.

Model 2: The Reliability-Based Shape Optimization (RBSO) consists of the coupling between several models: geometrical modeling, numerical simulation, and reliability analysis and optimization methods.

Model 3: The Reliability-Based Topology Optimization (RBTO) is based on the introduction of the reliability criteria into the topology optimization procedure. During this talk, I will present the last developments of Reliability-based Design Optimization in embedded electronics and mechatronical system.

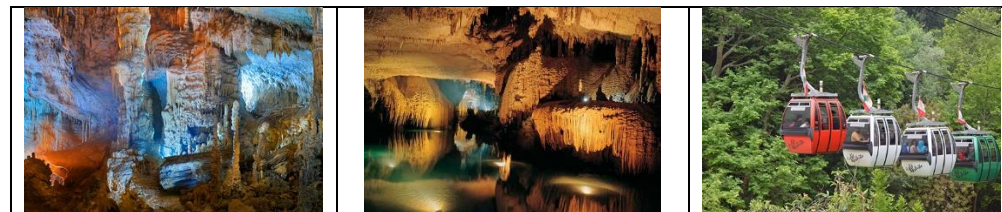
Time	2:45 pm – 3:45 pm
Title	Session 6: Room A

Chairs	Sorina Mortada & Sylvain Guillou
<b>Renewable Energy and Environment</b>	
<p>2- Effet de l'érosion par des particules de sable sur la performance des pales d'éoliennes dans les zones arides et semi-arides (<i>Ahmida Rezig</i>)</p> <p>23- Numerical modelling of the effect of the hydro- kinetic turbines on the transport of sediments - Application to The Rhone site (<i>Fatima Khaled</i>)</p> <p>22- Towards a turbulence characterization in tidal energy sites. First results of THYMOTE project (<i>Sylvain Guillou</i>)</p>	

Time	3:45 pm – 4:00 pm
Title	<b>Closing Ceremony</b>

## November 2, 2018 (Friday)

Time	8:30 am – 12:30 pm
Title	<b>Tour to Jeita Grotto</b>



<b>Presentation</b>	<p>Lebanon is a country of karst areas rich with mountains that offer spectacular scenery and scenic view and the mountainous caves are spread in different regions. In one of these regions in the valley of Nahr El-Kalb at 18 km North of Beirut, is found Jeita Grotto, one of the most marvelous natural wonders in the Middle-East, in spacious greenery. The road leading to the caverns is carved in the mountains and surrounded with trees. The all-around nature is perfectly in tune with the site.</p>
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<b>Tour Details</b>	<p style="text-align: center;"><b>Departure time and Location</b>        8:30 am from Lancaster Tamar Hotel        Boulevard General Emile Lahoud, Hadath</p> <p style="text-align: center;"><b>Return Time and Location</b>        12:15 pm to City Center        12:30 pm to Lancaster Tamar Hotel</p>
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