

International Conference
on Structural Nonlinear Dynamics and Diagnosis

Marrakech, May 15-17, 2023

*Adam Park
Hotel & SPA - Marrakech*



Address:
Avenue of the 7th Art, Marrakech, Morocco
212 5243-51100

Technical Program

Sunday, May 14, 2023		Registration at Adam Park 16:00			Welcome Reception: Adam Park 20:00				
Monday, May 15, 2023		Tuesday, May 16, 2023			Wednesday, May 17, 2023				
08:00	Registration Adam Park Hotel		09:00	Plenary Lecture 6			08:30	S6	S7
09:00	Opening Ceremony								
09:15	Plenary Lecture 1		09:30	Plenary Lecture 7			10:15	Coffee Break	
09:45	Plenary Lecture 2								
10:15	Coffee Break and Conference Photo		10:00	Coffee Break			10:15	Coffee Break	
10:50	Plenary Lecture 3		10:30	S1	S2	S3	10:45	Plenary Lecture 8	
11:20	Plenary Lecture 4						11:15	Plenary Lecture 9	
11:50	Plenary Lecture 5						11:45	Closing	
12:30	Lunch		12:30	Lunch			12:00	Lunch	
14:00	S1	S2	S3	14:00	S4	S5	S3		
15:45	Coffee Break		15:40	Coffee Break					
16:15	S1	S2	S3	16:10	S4	S5			
			20:00	Conference Dinner					

Sunday, May 14

16:00 Registration at Adam Park

20:00 Welcome Reception at Adam Park

Monday, May 15

09:00-09:15 Opening

09:15-10:15 Plenary Lectures Room: Louka Chairmen: F. Verhulst

09:15-09:45 **Muhammad R. Hajj, Stevens Institute of Technology, USA:**
Physics-informed neural networks for system identification of fluid-structure interactions

09:45-10:15 Jürgen Kurths, Potsdam Institute for Climate Impact Research, Germany:
Exploring predictability of extreme climate events via a complex network approach
Replaced by
Bernold Fiedler, Free University Berlin, Germany
Real chaos, and complex time

10:15-10:50 Coffee Break & Conference Photo

10:50-12:20 Plenary Lectures Room: Louka Chairmen: M. R. Hajj

10:50 -11:20 **Eihab Abdel-Rahman, University of Waterloo, Canada:**
Noise-Driven Sensors

11:20 -11:50 **Mohammed F. Daqaq, Clemson University, USA/NYU Abu Dhabi, UAE:**
Origami inspired design of nonlinear springs with tunable characteristics

11:50 -12:20 **Ivana Kovacic, University of Novi Sad, Serbia**
Bending and unbending a backbone curve of nonlinear oscillators

12:30-14:00 Lunch at Adam Park

14:00-15:45 **Parallel Sessions**

- **S1:**Dynamics of Micro/Nano Electromechanical Systems and Energy harvesting
- **S2:**Dynamics and Control of Oscillating Systems in Engineering Sciences
- **S3:**Dynamics of PDEs

	<i>S1: Room Tichka</i> <i>Chairman: M. Daqaq</i>	<i>S2: Room Tinmel</i> <i>Chairman: M. Semenov</i>	<i>S3 : Room Looka</i> <i>Chairmen: H. Zaag</i>
14:00-14:20	Dynamics of the energy harvesting system for a fixed, tuned and cyclically variable potential barrier D. Gąska, J. Margielewicz, S. Bucki, G. Litak, P. Wolszczak	Metamodeling and sensitivity analysis of a piezoelectric energy harvester based on polynomial chaos expansions R. Aloui, W. Larbi , M. Chouchane	14:00-14:30 Soliton resolution for the radial quadratic wave equation in six space dimensions C. Collot, T. Duyckaerts, C. Kenig, F. Merle
14:20-14:40	Nonlinear analysis of a rotating double pendulum energy harvester for tire pressure monitoring systems E. Zaouali, F. Najar, N. Kacem, E. Foltete	Nonlinear modelling and control of satellite with propellant sloshing dynamics M. A. Gonçalves, J. M. Balthazar, E. Jarzębowska , M. A. Ribeiro, A. M. Tusset, H. H Daum	14:35-15:05 Logarithmic corrections in kinetic reaction transport waves E. Bouin
14:40-15:00	On dynamical behavior and control of AFM: a review M. A. Ribeiro, J. M. Balthazar, I. Kirrou, A. M. Tusset, A. M. Bueno, H.H. Daum	A hybrid, low-level behavior-based steering as an alternative for computationally demanding approaches A. Chełchowski, E. Jarzębowska, A. Dębowski	15:10-15:40 Large-time dynamics of solutions of reaction-diffusion equations in R^N with general initial support F. Hamel
15:00-15:15	Nonlinear vibration energy harvesting based on weakly coupled biperiodic oscillators S. Dowlati, N. Kacem, E. Joseph, N. Bouhaddi	Nonlinear model fitting for sloshing using an equivalent pendulum mechanical model K. Cichorek, E. Jarzębowska, S. Gepner	
15:15-15:30	Methodological description of obtaining and stabilizing solitons in macromechanical damped resonators subjected to a base acceleration A. Barbosa, N. Kacem, N. Bouhaddi	Bifurcation analysis of a parametrically excited nonlinear micro-ring gyroscope A.Barakat, P. Hagedorn	
15:30-15:45		Galloping vibration energy harvesting using a van der Pol circuit M. Hamdi, M. Belhaq	

15:45-16:15 **Coffee Break**

16:15-18:00 **Parallel Sessions**

- S1: Dynamics of Micro/Nano Electromechanical Systems and Energy harvesting (Cont.)
- S2: Dynamics and Control of Oscillating Systems in Engineering Sciences (Cont.)
- S3: Dynamics of PDEs (Cont.)

	S1: Room Tichka <i>Chairmen: F. Najjar\N. Bouhaddi</i>	S2: Room Tinmel <i>Chairman: I. Kovacic</i>	S3 : Room Looka <i>Chairmen: N. Nouaili</i>
16:15-16:35	An origami inspired cellular cushion material A. Dalaq, S. Khazaaleh, M.F. Daqaq	Widening of anti-resonances by increasing amplitude of parametric excitation Z. Kraus, P. Hagedorn	16:10-16:40 Near-resonance approximation of rotating Navier-Stokes equations B. Cheng
16:35-16:55	A Reduced-order modeling approach for nonlinear vibration analysis of Piezoelectric micro-electro-mechanical systems J.F. Deü, A. Givois, O.Thomas	Dynamics modeling of an underwater glider based on the Boltzmann-Hamel equations approach with the relaxed symmetry constraint Z. Kostka, E. Jarzębowska	16:40-17:10 Scattering of solutions of the inhomogeneous nonlinear Schrödinger equation S. Tayachi
16:55-17:15	A comparative study of resonant drive techniques R. Abdelrahman, A. Elhady M. Yavuz, E. Abdel-Rahman F. Najjar, G. Bourbon, J. Lardies	A novel pseudorandom number generator based on a simple oscillatory system P.A. Meleshenko, M. Semenov	17:10-17:40 On a data assimilation algorithm for tumor growth S. Trabelsi
17:15-17:30	Performance analysis of a bi-stable point wave energy absorber under random waves M. Khasawneh, M.F. Daqaq	Nonlinear piezoelectric vibration energy harvesting of a cantilever beam using homotopy analysis method A. Nabarrete, J.L. Nabarrete, J.M. Balthazar	
17:30-17:45	A study of mathematical model of AFM with Casimir force by means of averaging method G.A. Kurina, J.M. Balthazar, M.A. Ribeiro, A.M. Tusset	Nonlinear model of disturbances acting on spacecraft attitude during a tubular boom deployment process M. Kukuryka, T. Barciński, E. Jarzębowska	
17:45-18:00	Harvesting energy with two coupled horizontal beams P. Wolszczak	Using a moving vehicle for detection of bridge natural frequencies Sh. Urushadze, J. D. Yau, J. Bayer	

Tuesday, May 16

09:00-10:00	Plenary Lectures	Room: Looka	Chairmen
09:00-09:30	Bernold Fiedler, <i>Free University Berlin, Germany</i> <i>Simultaneous noninvasive stabilization of infinitely many, large and rapid Duffng oscillations, by delayed feedback control</i>		H. Zaag
09:30-10:00	Hatem Zaag, <i>CNRS & University Sorbonne Paris Nord, France</i> <i>On degenerate blow-up profiles for nonlinear parabolic equations</i>		B. Fiedler
10:00-10:30	Coffee Break		

10:30-12:00 **Parallel Sessions**

- **S1:**Dynamics of Micro/Nano Electromechanical Systems and Energy harvesting (Cont.)
- **S2:**Dynamics and Control of Oscillating Systems in Engineering Sciences (Cont.)
- **S3:**Dynamics of PDEs (Cont.)

	S1: Room Tichka <i>Chairman: L. Kloda</i>	S2 : Room Tinmel <i>Chairmen: A. Nabarrete</i>	S3 : Room Looka <i>Chairman: C. Collot</i>
10:30-10:50	Energy harvesting in a system whose energy potential was mapped by the hyperbolic Fibonacci function J. Margielewicz, D. Gąska, S. Bucki, G. Litak, P. Wolszczak	Sampled-based methods used in an analysis of multistable dynamical systems P. Perlikowski, P. Brzeski	10:45-11:15 Mathematical study of the spread and blockage of an inflammatory disease S. Latrach, N. Vauchelet, H. Zaag
10:50-11:10	Modal interaction of MEMS shallow arch under out-of-plane fringing-fields H. Ouakad, F. Najar, N. Kacem	Dynamic modelling and diagnosis of a high contact ratio gear O.D. Mohammed	11:15-11:45 Singularities in the complex Ginzburg Landau equation N. Nouaili, G.K. Duon H. Zaag
11:10-11:30	MEMS electrostatic kinetic energy harvester with double capacitor bennet doubler conditioning circuit and autonomous buck DC/DC converter H. Samaali, F. Najar	Distributed hysteresis properties in the Euler-Bernoulli beam M. Semenov, P.A. Meleshenko, E.A. Karpov	11:45-12:15 Parameter recovery for the KdV equations via continuous data assimilation M. Azoua, A. Azouani, I. Hafidi
11:30-11:45	Electromechanical modeling and parametric analysis of L-shaped-based bending-torsion piezoelectric energy harvester A. Magdich, S. Baroudi, A. Abdelkefi, F. Najar	Remaining useful life estimation framework for maintenance improvement of rotor dynamic systems with crack propagation S.F. Zijp, A. Nabarrete, A. Martinetti, M.A. Arbelo,	
11:45-12:00	Optimizing output power in combined galloping and vortex-induced vibrations-based electromagnetic energy harvesting Y. El Moussati, M. Mustapha, M. Belhaq	Effect of periodic vibrations with frequency modulation on convective instability in porous media K. Allali, M. Belhaq	

12:30-14:00 **Lunch**

14:00-15:40 **Parallel Sessions**

- S4: Dynamics of Mechanical Structures and Structural Health Monitoring
- S5: Modeling, Control and Analysis of Switching systems
- S3: Dynamics of PDEs (Cont.)

	S4: Room Tichka <i>Chairman: J. Latalski</i>	S5 : Room Tinmel <i>Chairman: A. El Aroudi/K. Mandal</i>	S3: Room Looka <i>Chairman: F. Hamel</i>
14:00-14:20	Optimizing the bandgap region of a meta-beam with bistable resonators J.P. Norenberg, A. Cunha Jr	Backstepping control of interleaved double dual boost converter for renewable energy system F. Ait Bellah, A. Abouloifa, A. El Aroudi, C. Aouadi, S. Echalih	14:00-14:30 Oscillatory dynamics for evolution equations using Favard's theory in uniformly convex Banach spaces K. Ezzinbi
14:20-14:40	Time integration of constrained multi-catenary systems D. Sedlar, Z. Lozina	A Cascaded controller design for grid connected PV system through a double stage based on SIDO converter O. Arich, A. Abouloifa, S. Echalih	14:30-15:00 Blow up of p-Laplacian type heat equation with nonlinear source term Y. Abouelhanoune, A. Azouani
14:40-15:00	Reliability analysis of mechanical structure with surrogate model L. Shao, A. Saidi, A. Zine, M. Ichchou	Global dynamical analysis of a boost converter with a constant power load and actively damped by a series loss free resistor L. Benadero, A. El Aroudi, M. Sebastián-Rullo, H. Valderrama-Blavi, A. Cid-Pastor, L. Martínez Salamero	
15:00-15:20	Multi-scale dynamics and nonlinear eigenvalue problem of heterogeneous metastructures using a wave finite element scheme and modal strain energy method D. Cui, M. Ichchou, A. Zine, N. Atalla	Stabilization of a photovoltaic power source interfacing a current-mode controlled SEPIC converter with MPPT using piecewise quadratic slope compensation K. Mandal, A. El Aroudi	
15:20-15:40	Nonlinear vibration of thin imperfect plate by an asymptotic numerical method L. Benchouaf, E.H. Boutyour	Nonlinear control of grid connected PV systems using modular multilevel converter A. El Boudali, A. Abouloifa, M. Aourir, C. Aouadi, A. El Aroudi	

15:40-16:10 Coffee Break

16:10-18:00 Parallel sessions

- S4: Dynamics of Mechanical Structures and Structural Health Monitoring (Cont.)
- S5: Modeling, Control and Analysis of Switching systems (Cont.)

	S4: Room Looka <i>Chairman: P. Hagedorn</i>	S5 : Room Tinmel <i>Chairman: A. El Aroudi/K. Mandal</i>
16:10-16:30	Parametric resonances and stability of the rotating blade subjected to base excitation J. Latalski, J. Warminski	Backstepping based control and stability analysis for single stage grid connected photovoltaic system through half Bridge power Inverter N. Hourri, A. Abouloifa, A. El Aroudi, Z. Hekss, M. Aourir, S.Echalih, O. Arich
16:30-16:50	Enhanced group analysis and analytical solutions for the mode shapes of nonuniform rods A. W. Nunes, A. Ruiz, S. da Silva, S. Dimas	Interaction of multiple timescale dynamics of interconnected subsystems in electric vehicle K. Mandal, A. El Aroudi
16:50-17:10	Nonlinear dynamics and energy harvesting of multi-stable cantilever shells with embedded piezoelectric patch L. Kloda, M. Brunetti, A. Mitura, F. Romeo, J. Warminski, D. Melnyk	Exact numerical method for predicting instabilities of switching converters with constant power load K. Mandal, A. El Aroudi
17:10-17:30	Piecewise integrable neural network: an interpretable chaos identification framework N. Novelli, P. Belardinelli, S. Lenci	Shunt active power filter based on the npc structure : harmonics neutralization and reactive power injection O. Mikram, A. Abouloifa, I. Lachkar, M. Aourir, C. Aouadi
17:30-17:45	Linear and nonlinear vibration biodynamic models of hand-arm systems N. Hida, M.A. Aouadi, F. Lakrad	Backstepping based control and stability analysis for three-phase four-wire shunt active power filter K. Naftahi, A. Abouloifa, Z. Hekss, S. Echalih, F. Ait bellah, A. El Aroudi
17:45-18:00	Stadium roof structure analysis in dynamics P. Rosko	The impact of high-frequency excitation on bistable energy harvesting system Z. Ghouli, G. Litak

20:00-23:00 Conference Dinner

Wednesday, May 17

08:30-10:15 **Parallel sessions**

- S6: Recent Advances in Nonlinear Dynamics
- S7: Time Delayed Systems and Quasi-periodic Systems

	S6: Room Louka <i>Chairman: E. Ponce/F. Torres</i>	S7 : Room Tinmel <i>Chairman: G. Litak</i>
08:30-08:50	Torsion-bending coupling in non-linear model order reduction L. Silveira	A novel algorithm for dynamical integrity estimation in time delayed systems B. Szaksz, G. Habib
08:50-09:10	Dynamics and bifurcation of the Rattleback, a nonholonomic system J. Galán-Vioque, J. Valverde, E. Briales	Design of a full-scale wave energy converter: challenges and technological solutions M. Hajj et al.
09:10-09:30	Normal form around a double invisible tangency point F. Torres, M. Esteban, E. Freire, E. Ponce	Kalman filtering of stochastic laser dynamics: parameter and state space estimation from time-delayed measurements L. Mertenskötter, M. Kantner
09:30-09:45	Some bifurcations from periodic orbits at infinity in 3D piecewise linear systems E. Ponce, E. Freire, M. Ordóñez, J. Ros, E. Vela	Quasi-periodic birhythmicity in a multicycle van der Pol oscillator with modulated time delay M. Hamdi, M. Belhaq
09:45-10:00	Saddle-node bifurcation curve and hidden attractors in 4D memristor oscillator J. Ros, E. Ponce, A. Amador	Incremental harmonic balance with two time scales for a nonlinear quasi-periodic Mathieu equation B.X. Zhang, J.L. Huang, W.D. Zhu
10:00-10:15		Quasi-periodic energy harvesting in a delayed Rayleigh-Duffing harvester device near primary and secondary resonances I. Kirrou, A. Bichri, M. Belhaq

10:15-10:45 **Coffee Break**

10:45-11:45	Plenary Lectures	Room: Looka	Chairman
10:45-11:15	Ferdinand Verhulst, University of Utrecht, The Netherlands <i>Emergence and approximation of tori</i>		E. Ponce
11:15-11:45	Grzegorz Litak, Lublin University of Technology, Poland <i>Identification of failures in the dynamical response of machines</i>		E. Jarzębowska
11:45	Closing		
12:00	Lunch		