39th Annual Oklahoma AIAA – ASME Symposium

Saturday, April 6, 2019
Keplinger Hall
Mechanical Engineering, The University of Tulsa
Tulsa, Oklahoma

Agenda

8:00 - 9:00 **REGISTRATION**

9:00 - 9:15 **INTRODUCTION AND WELCOME** KEP 2040/M1
Welcome by Dr. John M. Henshaw
Chair of Mechanical Engineering Department

9:15 - 10:35 **TECHNICAL SESSIONS A**

Session 1-A: Fluids I	KEP 2005/M2
Session 2-A: Fluids II	KEP 2065/M8
Session 3-A: CFD/Numerical Methods I	KEP 2050/M9
Session 4-A: Instrumentation/Controls I	KEP 3030/U1
Session 5-A: Thermal I	KEP 3010/U2
Session 6-A: Materials	KEP 3005/U3
Session 7-A: Design	KEP 3065/U9

10:35 - 10:45 **COFFEE AND REFRESHMENT BREAK**

10:45 – 12:05 **TECHNICAL SESSIONS B**

Session 1-B: Fluids III	KEP 2005/M2
Session 2-B: Manufacturing	KEP 2065/M8
Session 3-B: CFD/Numerical Methods II	KEP 2050/M9
Session 4-B: Instrumentation/Controls II	KEP 3030/U1
Session 5-B: Thermal II	KEP 3010/U2
Session 6-B: Micro/Nanotechnology	KEP 3005/U3
Session 7-B: Biomedical Engineering	KEP 3065/U9

12:15 – 2:00 **LUNCH AND KEYNOTE SPEAKER** Allen Chapman Student Union Great Hall B

SPEAKER: Paul Guentert, Director
Facilities Maintenance – Technical Operations, American Airlines

2:00 pm **ADJOURNMENT**

39th Annual Oklahoma AIAA – ASME Symposium Keynote Speaker

Paul Guentert

Director, Facilities Maintenance – Technical Operations, American Airlines

@ Great Hall B, Allen Chapman Student Union

Scope:
An in-depth review of the maintenance base will be discussed including the following:

- Airline Safety- "where we have come from and where are we today" at American Airlines and the airline industry
- Maintenance operations/ manufacturing opportunities
- Roles of tomorrow's engineer "what will they most likely be involved with and what will they be doing".

Biography:

Paul began his Career in Aviation at the age of 16. After completing aviation maintenance technician school, he served in U.S. Army serving 3 years gaining extensive rotary wing experience. Throughout his 43 years in aviation maintenance and operations, he has worked in General Aviation, Commercial Aviation maintaining, rebuilding, manufacturing and restoring aircrafts. For the past 32 years, he has held numerous leadership positions within American Airlines. His current role is unique; He supports and is responsible for the all Aircraft Maintenance facilities in the United States for American Airlines. Paul holds a Masters of Aeronautical Science Degree (MAS) from Embry-Riddle Aeronautical University in Aeronautics. His Undergraduate degree is in Aviation Management from Southern Illinois University. Paul also holds a FAA Mechanics Certificate (A&P) with an Inspection Authorization (IA).

Paul is actively involved in the local community promoting Aviation education, teaching as adjunct faculty, and identifying skills necessary for tomorrow's technicians.

9:15 A.M.	9:35 A.M.	9:55 A.M.	10:15 A.M.
Session 1-A: **Fluids I**	*Chaired by: Dr. Srinivas Swaroop Kolla, The University of Tulsa*		KEP 2005/M2 (pp. 7-11)
Ready - Aim - Pig A. Morton *T.D. Williamson, Tulsa* p. 8	**Flow Physics of Wall Jet Film in Gas-Liquid Cylindrical Cyclone Compact Separator Under Control Configuration** S.S. Kolla, R.S. Mohan, O. Shoham *University of Tulsa, Tulsa* p. 9	**Experimental Investigation of Annular Liquid Film Thickness Using Planar Laser Induced Flurescent** S. Mohagheghian, A.J. Ghajar, B.R. Elbing *Oklahoma State University, Stillwater* p. 10	**Mechanistic Model to Predict the Entrainment of Gas in Gas-Liquid Cylindrical Cyclone Compact Separator** S.S. Kolla, R.S. Mohan, O. Shoham *University of Tulsa, Tulsa* p.11
Session 2-A: **Fluids II**	*Chaired by: Dr. Soroor Karimi, The University of Tulsa*		KEP 2065/M8 (pp. 12-16)
Primary Breakup of Flat Fan Spray in Crosswind M.S. Raza, S.L. Post, K.A. Sallam *Oklahoma State University, Tulsa* p. 13	**Erosion of Fine Particles** S. Karimi *University of Tulsa, Tulsa* p. 14	**Comparison of Nanoparticle and Surfactant Oil/Water Emulsion Separation Kinetics** I. Gavrielatos, R. Dabirian, R. Mohan, O. Shoham *University of Tulsa, Tulsa* p. 15	**Slug Dissipation in an Improved Enlarged Impacting Tee Junction** T. Cole, R. Dabirian, R. Mohan, O. Shoham *University of Tulsa, Tulsa* p. 16
Session 3-A: **CFD/Numerical Methods I**	*Chaired by: Dr. Michael Henneke, John Zink Company*		KEP 2050/M9 (pp. 17-21)
Staggered Reduced Order Model for Shallow Water Equations: POD vs DMD S.E. Ahmed, O. San *Oklahoma State University, Stillwater* p. 18	**CFD-Based Erosion Simulations of Elbows in Series for Liquid-Dominated Flows** T.A. Sedrez, S.A. Shirazi *University of Tulsa, Tulsa* p. 19	**Numerical Study of the Capillary Rise Phenomenon Between Vertical Parallel Planar Walls** M. Naghashnejad, H. Shabgard *University of Oklahoma, Norman* p. 20	**Model Discovery Using Deterministic Symbolic Regression** H. Vaddireddy, O. San *Oklahoma State University, Stillwater* p. 21
Session 4-A: **Instrumentation/Controls I**	*Chaired by: Dr. Larry Hoberock, Oklahoma State University*		KEP 3030/U1 (pp. 22-26)
Robot-Assembled Power-Takeoff Research R. Ernst, S. Hilborn, W. Russell *Oral Roberts University, Tulsa* p. 23	**Approaches to Improve the Response Performance of Cooling Coil Valve Control System** R. Hurt, L. Song *University of Oklahoma, Norman* p. 24	**Dynamic Modeling for Variable-Speed HVAC System to Support Optimal Controller Design** H. Liu, J. Cai *University of Oklahoma, Norman* p. 25	**Testing and Characterization of Stem Seals at Critical Operating Conditions** O. Umanskaya, J. Keegan, Z. Siddique *University of Oklahoma, Norman* p. 26
Session 5-A: **Thermal I**	*Chaired by: Dr. Charles (Chuck) E. Baukal, Jr., John Zink Company*		KEP 3010/U2 (pp. 27-31)
Investigations of Meat Product Clumping in CO2 Tunnel Freezer E. Lyons, Y. Lee *Oral Roberts University, Tulsa* p. 28	**Effect of Evaporation Ratio on Small-Scale Mechanical Vapor Compression Desalination** A.J. Williamson, K.A. Sallam *Oklahoma State University, Tulsa* p. 29	**Analytical Study of Melting of PCM in Annular Space Subject to Convective Boundary Conditions** W. Zhu, H. Shabgard *University of Oklahoma, Norman* p. 30	**Preliminary Energy Performance Study of an Integrated Heating, Cooling, and Hot Water System with Latent Heat Thermal Energy Storage in Different US Climate Zones** E. Hakizimana, H. Shabgard *University of Oklahoma, Norman* p. 31
Session 6-A: **Materials**	*Chaired by: Dr. Michael Keller, The University of Tulsa*		KEP 3005/U3 (pp. 32-36)
Dissipations in Liquid Crystal Elastomers at the Nematic-Isotropic Transition J.W. Wallace, A. Azoug *Oklahoma State University, Stillwater* p. 33	**PCM Integration in Supply Air Ductwork for Increased Building Power Flexibility** Z. Jiang, J. Cai *University of Oklahoma, Norman* p. 34	**Inhibited Erosion-Corrosion of Carbon Steel in Sweet Production with CaCO3 versus Sand Particles** A. Nassef, M. Keller, K. Roberts, E. Iski, E. Rybicki, S. Shirazi, *University of Tulsa, Tulsa* p. 35	**Characterization of Spring Gaskets in Dynamic Aggressive Conditions** B. Mansur, M. Najafbeygi, Z. Siddique *University of Oklahoma, Norman* p. 36
Session 7-A: **Design**	*Chaired by: Dr. Jeremy Daily, The University of Tulsa*		KEP 3065/U9 (pp. 37-41)
A Submerged Cleaner with Undulating Tracing Execution (SCUTE) M. Barreiro, L. Reynolds, B. Romber *Oral Roberts University, Tulsa* p. 38	**Permanent Lock Open Tool - Secondary Tools for Subsurface Safety Valves** S. Crosby, U. Munguia *Oral Roberts University, Tulsa* p. 39	**Helmet Design for Chinchilla Head Towards Reduction of Brain Damage to Blast Overpressure** A. Gannon, K. Smith, S. Jiang, M. Brown, R. Gan *University of Oklahoma, Norman* p. 40	**Water Purification in Hatcliffe, Harare, Zimbabwe** L. Knibbe, V. Mavika, E. Stapleton *Oral Roberts University, Tulsa* p. 41

10:45 A.M.	11:05 A.M.	11:25 A.M.	11:45 A.M.
Session 1-B: **Fluids III**	*Chaired by: Dr. Khaled Sallam, Oklahoma State University*		KEP 2005/M2 (pp. 42-46)
Electrohydrodynamic Gas Pumps F.C. Lai *University of Oklahoma, Norman* p. 43	**Effect of Injection Angle on Shock Diamonds of Under Expanded Gas Jet** A.M. Sheridan, S. Srivastava, M. Henneke, K.A. Sallam *Oklahoma State University, Tulsa* p. 44	**A Gas Carry-Under Model Under Control Configuration** S.S. Kolla, R.S. Mohan, O. Shoham *University of Tulsa, Tulsa* p. 45	**Stratified Air-Water Flow Analysis in a Horizontal Pipe** S.S. Kolla, R.S. Mohan, O. Shoham *University of Tulsa, Tulsa* p. 46
Session 2-B: **Manufacturing**	*Chaired by: Dr. Jeremy Daily, The University of Tulsa*		KEP 2065/M8 (pp. 47-50)
Additive Manufacturing of HDPE Using Selective Laser Sintering B. Hoelzel *University of Oklahoma, Norman* p. 48	**A 3D Printed Ear Model for Standardized Testing of Hearing Protection Devices to Blast Exposure** M. Brown, S. Jiang, R. Gan *University of Oklahoma, Norman* p. 49	**Directly 3D Printing a Soft Artificial Heart** J.D. Hernandez, M.G. Kern, J. Ndhlovu *Oral Roberts University, Tulsa* p. 50	
Session 3-B: **CFD/Numerical Methods II**	*Chaired by: Dr. Hamidreza Shabgard, University of Oklahoma*		KEP 2050/M9 (pp. 51-55)
Numerical Analysis of Oil-Water Flow in HPS S.S. Kolla, R.S. Mohan, O. Shoham *University of Tulsa, Tulsa* p. 52	**Fully-Implicit Direct Force Fictitious Domain Method for Particulate Flows** P. Javidmand, H. Shabgard *University of Oklahoma, Norman* p. 53	**On the Development of Robust Reduced Order Model Frameworks for Partial Differential Equation Systems: Current Status and Future Prospects** S.M. Rahman, O. San *Oklahoma State University, Stillwater* p. 54	**Numerical Assessment of Higher Order Compact Scheme for Poisson Equation** S. Pawar, O. San *Oklahoma State University, Stillwater* p. 55
Session 4-B: **Instrumentation/Controls II**	*Chaired by: Dr. Ramin Dabirian, The University of Tulsa*		KEP 3030/U1 (pp. 56-60)
Improvement of User Navigation of Prototype Rover Through Different Video Feed Options J. Dal Santo, D. Miller *University of Oklahoma, Norman* p. 57	**Apergy Test Bench and Gauges** K. James, D. Lacerda *Oral Roberts University, Tulsa* p.58	**Development of an Integrated Optical-Mechanical System for Quantification of Dynamic Collagen Microstructure in Heart Valve Leaflets** S. Jett, Z. Schuermann, C.H. Lee *University of Oklahoma, Norman* p. 59	**Degradation Assessment of Rotary Seals Based on Multi-Sensor Neural Network Model** M. Ramachandran, Z. Siddique *University of Oklahoma, Norman* p. 60
Session 5-B: **Thermal II**	*Chaired by: Dr. Charles (Chuck) E. Baukal, Jr., John Zink Company*		KEP 3010/U2 (pp. 62-65)
Flames as a Robust and Facile Method for the Synthesis of Complex Structural and Chemical Morphologies W. Cuello Jimenez, W. Merchan-Merchan *University of Oklahoma, Norman* p. 62	**Improvement of Air Mixer Performance for HVAC Testing Applications: CFD Simulations (RP-1733)** M. Ahmed, O. San, C.K. Bach *Oklahoma State University, Stillwater* p. 63	**Investigation of the Impact of Home Thermal Properties on the Effectiveness of Pre-cooling for Optimal Space Temperature Set Point** J. Wang, C.Y. Tang, L. Song *University of Oklahoma, Norman* p. 64	**Fault Detection and Diagnosis of Air Handling Unit in HVAC System Using Cloud-Based Data Logging System** D. Lee, L. Song *University of Oklahoma, Norman* p. 65
Session 6-B: **Micro/Nanotechnology**	*Chaired by: Dr. Ilias Gavrielatos, The University of Tulsa*		KEP 3005/U3 (pp. 67-70)
Methodology for Breaking Up Nanoparticle Stabilized Oil-Water Emulsion I. Gavrielatos, C. Nunez, R. Dabirian, R. Mohan, O. Shoham *University of Tulsa, Tulsa* p. 67	**Investigation of Rheology and 3-D Printability of PDMS Nanocomposites Ink** A. Mondal, M. Sukati, M. Charara, M.C. Saha, Y. Liu *University of Oklahoma, Norman* p. 68	**Fabrication and Characterization of Porous PDMS Close-Cell Microstructure** M. Sukati, J. Scimeca, M.C. Saha *University of Oklahoma, Norman* p. 69	**Hybrid Self-Assembled ZnO Nanostructures on Carbon Fiber for Wettability Application** J. Wang, Y. Liu *University of Oklahoma, Norman* p. 70
Session 7-B: **Biomedical Engineering**	*Chaired by: Dr. Junfeng Liang, University of Oklahoma*		KEP 3065/U9 (pp. 71-75)
Experimental Measurement and Finite Elemental Simulation on Surface Motion of Human Tympanic Membrane After Blast Exposure S. Jiang, X. Wang, R.Z. Gan *University of Oklahoma, Norman* p. 72	**Studying the Inner Ear Mutual Mechanics Between Hearing and Balance with Finite Element Solution** J. Liang, M. Brown, P.V. Welch, A. Hedjoudge, C.C. Della Santina, C. Dai *University of Oklahoma, Norman* p. 73	**Development of a Finite Element Framework for Investigations of Pathological Effects on Organ-Level Tricuspid Valve Function** D. Laurence, B.S. Lee, C.H. Lee *University of Oklahoma, Norman* p. 74	**Posture Changes During Pregnancy: Influence of Footwear on the Risk of Falling of Pregnant Women** A. Haddox, J. Kasitz, O. Mallet, J. Hausselle, A. Azoug *Oklahoma State University, Stillwater* p. 75