



INTERNATIONAL CENTRE FOR HEAT AND MASS TRANSFER

## TURBINE-09

International Symposium on Heat Transfer in Gas Turbine Systems

9 - 14 August 2009, Dedeman Hotel and Convention Center  
Antalya, TURKEY

## PROGRAM

### SUNDAY, AUGUST 9, 2009

15.00 – 18.00 Registration

19.00 – 20.00 Welcome  
Reception

### MONDAY, AUGUST 10, 2009

08.00 – 08.50 Registration

08.50 – 09.00 Opening

09.00 – 10.20	<b>Session 1</b> Chair: R. J. GOLDSTEIN	
	Keynote	Turbine Airfoil Leading Edge Aerodynamics and Heat Transfer – A Review <i>Lee S. LANGSTON, Brian M. HOLLEY</i>
	Keynote	Recent Progress in Numerical Simulation of Highly Three-Dimensional Turbulent Flows and Endwall Heat Transfer in Turbine Blade Cascades <i>Evgueni M. SMIRNOV</i>

10.20 – 10.40 Coffee Break

10.40 – 13.00	<b>Session 2</b> Chair: T. W. SIMON	
	18-TE	Experimental Investigation of Turning Flow Effects on Innovative Trailing Edge Cooling Configurations with Elliptic Pin Fins <i>Carlo CARCASCI, Francesco SIMONETTI</i>
	33-THT	Heat Transfer Characteristics on Tip and Inner Rim Surfaces of Rotor Blade with Squealer Rim <i>Jun Su PARK, Dong Hyun LEE, Woo Jin LEE, Hyung Hee CHO, Dong-Ho RHEE, ShinHyung KANG</i>
	38-THT	Advanced Aero-thermal Investigation of High Pressure Turbine Tip Flows <i>Péter VASS, Tony ARTS</i>
	42-TE	Trailing Edge Film Cooling of Gas Turbine Airfoils –Effects of Ejection Lip Geometry on Film Cooling Effectiveness and Heat Transfer <i>Tim HORBACH, Achmed SCHULZ, Hans-Joerg BAUER</i>
	52-THT	Augmented Heat Transfer of an Internal Blade Tip by Full or Partial Arrays of Pin-fins <i>Gongnan XIE, Bengt SUNDEN, Lieke WANG, Esa UTRAINIEN</i>
	62-THT	Flow and Heat Transfer on and near a Transonic Turbine Blade Tip <i>Qiang ZHANG, Devin O'DOWD, Phillip LIGRANI, Li HE, Andrew WHEELER</i>
	22-JI	Effects of Mach Number, Reynolds Number, and Jet Spacing on Surface Heat Transfer for a Full Array of Impinging Jets <i>Matt GOODRO, Phil LIGRANI, Mike FOX, Hee-Koo MOON</i>

13.00 – 15.00 Break

15.00 – 17.00	<b>Session 3</b> Chair: A. I. LEONTIEV	
	Keynote	<a href="#">Turbine Airfoil Aerothermal Characteristics in Future Coal-Gas Based Power Generation Systems</a> <i>Minking K. CHYU, Mary Ann ALVIN</i>
	32-COMB	<a href="#">Thermal-mechanical Life Prediction in After Shell Section of Gas Turbine Combustion Liner</a> <i>Kyung Min KIM, Yun Heung JEON, Namgeon YUN, Dong Hyun LEE, Hyung Hee CHO</i>
	68-COMB	<a href="#">Coupling Study between heat Transfer and Aerodynamic Flow in Square-edged Inlet</a> <i>Phu Hung NGUYEN, Viet Hung NGUYEN, Eva DORIGNAC</i>
	60-COMB	<a href="#">Heat Transfer Investigation of the Sub- and Supercritical Fuel Flow through a U-turn Tube</a> <i>C. B. ZHANG , Z. TAO , G. Q. XU , H. W. DENG, J. N. SUN</i>

17.00 – 17.20 Coffee Break

17.20 – 18.40	<b>Session 4</b> Chair: B.V.S.S.S. PRASAD	
	11-SA	<a href="#">Calculation of Gas Turbine Blade Temperatures Using an Iterative Conjugate Heat Transfer Approach</a> <i>Mangesh KANE, Savas YAVUZKURT</i>
	43-FC	<a href="#">Effect of Internal Rib Configurations on the Discharge Coefficient of a 30-deg Inclined Film Cooling Hole</a> <i>Christian HENEKA, Achmed SCHULZ, Hans-Joerg BAUER</i>
	61-FC	<a href="#">Influence of Internal Cyclone Flow on Adiabatic Film Cooling Effectiveness</a> <i>Andreas LERCH, Heinz-Peter SCHIFFER</i>
	69-FC	<a href="#">Study on the Thermal and Flow Fields of Film Cooling with Shaped Film Cooling Holes</a> <i>Kenichiro TAKEISHI, Satoshi HADA, Shohei MORI, Masaharu KOMIYAMA</i>

**TUESDAY, AUGUST 11, 2009**

09.00 – 10.20	<b>Session 5</b> Chair: A. SCHULZ	
	Keynote	Film Cooling: Breaking the Limits of Diffusion Shaped Holes <i>Ron S. BUNKER</i>
	Keynote	Experimental determination of the aero-thermal performance of high pressure gas turbine blades <i>Tony ARTS</i>

10.20 – 11.00	<b>Coffee Break &amp; Posters</b>	
	8-COMB	Experimental Study of Equivalence Ratio Influence on Thermoacoustic Instability in Gas Turbines <i>Nasser Seraj MEHDIZADEH, Nozar AKBARI, Reza EBRAHIMI</i>
	35-COMB	Analytical and Experimental Analysis of Reactants Velocity Effect on Instability of Premixed Combustion Chamber <i>Nasser SERAJ MEHDIZADEH, Nozar AKBARI, Reza EBRAHIMI</i>
	23-FC	A Comparative Study of the Film Cooling Hole Configuration Effects on the Leading Edge of Asymmetrical Turbine Blade <i>Mustapha BENABED, Abbès AZZL, B. A JUBRAN</i>
	28-FC	Comparison Study of Closure Models for Modeling a Flow on Curved and Flat Plates. Film Cooling of Gas Turbine Blade Application <i>R. DIZENE, A. BERKACHE, S. BENMANSOUR</i>
	29-FC	First Moment Closure Modeling of Film Cooling Effectiveness in Single Row of Cylindrical Holes <i>Farzad BAZDIDI-TEHRANI, Hosein FOROUTAN, Mehran RAJABI-ZARGARABADI</i>
	27-EFHT	Front Bulkhead Upstream Flow Effect on the Inlet Guide Vanes of MS5002B Gas Turbine Compressor <i>D. CHERKERKER, Rabah DIZENE</i>
	30-EFHT	Modeling of Heat Transfer in Exhaust Nozzle of Gas Turbines <i>Özge ALTUN, Y. Erhan BÖKE</i>
	3-SA	A New Unsteady Fluid Network Approach to Simulate the Characteristics of the Air System of a Gas Turbine System <i>Shengping HOU, Zhi TAO, Shuiting DING</i>
	40-SA	Optimization of a Gas Turbine Stator Nozzle Cooling Using Genetic Algorithms <i>Biagio MORRONE, Andrea UNICH, Antonio MARIANI, Vincenzo de MAIO</i>
	53-EW	Optimization of a Turbine Vane Endwall Using a Combined Natural and Numerical Approach <i>S.O. NEUMANN, H. STEINBRÜCK, S. ZEHNER, B. WEIGAND</i>
	65-EW	Effects of Stator/rotor Leakage Flow and Axisymmetric Contouring on Endwall Adiabatic Effectiveness <i>Ryan ERICKSON, Terrence W. SIMON</i>
	66-EW	Effects of Wheel-space Coolant Injection and Gap Geometry on Blade Endwall Heat/Mass Transfer <i>Marco PAPA, V. SRINIVASAN, R. J. GOLDSTEIN, Fabio GORI</i>
	39- P	Impact of the Geometry on the Improvement of the Thermal Transfer of the Turbulent Flows <i>Ahmed Zineddine DELLIL, Abbès AZZI</i>
	54-SA	Combined Heat Exchange Intensification Techniques as a Key to Development of Automotive <i>Anatoly V. SUDAREV</i>
	59-CHFT	PIV Measurements of the Flow in a Rotating Cavity with a Radial Inflow <i>Yu XIAO, X. LUO, G. Q. XU, J. N. SUN</i>

11.00 – 12.20	<b>Session 6</b> Chair: A. I. KIRILLOV	
	6-FC	<a href="#">Study on Influence of Initial Wall Temperature Distribution on the Transient Measurement Results of Film Cooling</a> <i>Cun-liang LIU, Hui-ren ZHU, Jiang-tao BAI, Du-chun XU</i>
	10-FC	<a href="#">Comparison of Film Cooling in the Presence of Various Mainstream Pressure Gradients</a> <i>Cun-liang LIU, Hui-ren ZHU, Guang-Chao LI, Du-chun XU</i>
	16-FC	<a href="#">A Correlation-based Methodology to Predict the Flow Structure of Flows Emanating from Cylindrical Holes with Application to Film Cooling</a> <i>Tilman auf dem KAMPE, Stefan VOLKER</i>
	25-FC	<a href="#">Effect of the Geometry of Film Cooling Holes on Heat Transfer Coefficient in Condition of Various Mainstream Pressure Gradients</a> <i>Xiao-wei ZHANG, Hui-ren ZHU, Guang-Chao LI, Du-chun XU</i>

12.20 – 15.00 Break

15.00 – 17.00	<b>Session 7</b> Chair: K. TAKEISHI	
	Keynote	<a href="#">Film Cooling Simulation and Control</a> <i>Sumanta ACHARYA</i>
	12-EFHT	<a href="#">Turbine Vane Cascade Heat Transfer Predictions Using a Modified Version of the <math>\gamma - Re_{\theta t}</math> Laminar-Turbulent Transition Model</a> <i>Evgueni SMIRNOV, Alexander SMIRNOVSKY</i>
	26-CHFT	<a href="#">Large Eddy Simulation of Non-isothermal Flow in Rotor/stator Cavity</a> <i>Ewa TULISZKA-SZNITKO, Artur ZIELINSKI, Wojciech MAJCHROWSKI</i>
	63-SA	<a href="#">Comparison of Counter – Rotating and Traditional Axial Aircraft Low-pressure Turbines Integral and Detailed Performances</a> <i>Leonid MOROZ, Petr PAGUR, Yuri GOVORUSCCHENKO, Kirill GREBENNIK</i>

17.00 – 17.20 Coffee Break

17.20 – 18.00	<b>Session 8</b> Chair: P. LIGRANI	
	9-EW	<a href="#">Numerical Simulation of the Endwall Heat Transfer in the Langston Cascade</a> <i>Alexander M. LEVCHENYA, Evgueni M. SMIRNOV, Dmitry ZAYTSEV</i>
	44-EW	<a href="#">An Experimental Study of Airfoil and Endwall Heat Transfer in a Linear Turbine Blade Cascade – Secondary Flow and Surface Roughness Effects</a> <i>Marco LORENZ, Achmed SCHULZ, Hans-Jörg BAUER</i>

20.00 – 23.00 Gala Dinner

WEDNESDAY, AUGUST 12, 2009

09.00 – 10.40	<b>Session 9</b> Chair: A. SCHULZ	
	Keynote	<a href="#">Heat Transfer Testing in Engine Turbine Cooling System Development</a> <i>Peter IRELAND</i>
	17-IFHT	<a href="#">Predicting the Coolant Flow and Heat Transfer in Radial Turbine Blades</a> <i>Aidin PANAHI, Mozzafar Ali MEHRABIAN</i>
	21-IFHT	<a href="#">Effect of Rotation to the Cyclone Cooling Method Mass Transfer Measurements</a> <i>Nils WINTER, Martin KEGALJ, Heinz-Peter SCHIFFER</i>

10.40 – 11.00 Coffee Break

11.00 – 12.00	<b>Session 10</b> Chair: T. W. SIMON	
		<a href="#">The Role of Gas Turbines in Global Energy Conversion</a> <i>Lee S. Langston</i>

12.00 - End of Day

**THURSDAY, AUGUST 12, 2009**

09.00 – 10.20	<b>Session 11</b> Chair: E. DORIGNAC	
	Keynote	<a href="#">Recent Studies in Turbine Blade Internal Cooling</a> <i>Je-Chin HAN, Mike HUH</i>
	Keynote	<a href="#">Multiple Jet Impingement – A Review</a> <i>Bernhard WEIGAND, Sebastian SPRING</i>

10.20–10.40 Coffee Break

10.40 – 13.00	<b>Session 12</b> Chair: F. MARTELLI	
	7-JI	<a href="#">Influence of Height to Diameter Ratio on Impingement Heat Transfer on Effused Concave Surface</a> <i>M. Ashok KUMAR, B.V.S.S.S. PRASAD</i>
	19-JI	<a href="#">Experimental Study of Heat Transfer from Impinging Jet with Upstream and Downstream Crossflow</a> <i>Daniel THIBAUT, Matthieu FENOT, Gildas LALIZEL, Eva DORIGNAC</i>
	41-JI	<a href="#">An Experimental and Numerical Investigation of Impingement Heat Transfer in Airfoils Leading-edge Cooling Channel</a> <i>M. E. TASILIM, A. ABDELRASOUL</i>
	34-IFHT	<a href="#">Liquid Crystal Thermography for Transient Heat Transfer Measurements in Complex Internal Cooling Systems</a> <i>Rico POSER, Jens von WOLFERSDORF</i>
	47-JI	<a href="#">Experimental (by tlc Method) and Theoretical Analyse of Heat Transfer Characteristics on a Rectangular Cross-section Duct with Impingement Jet</a> <i>Unal UYSAL, Fatih SAHIN, M. K. CHYU</i>

13.00 – 15.00 Break

15.00 – 17.00	<b>Session 13</b> Chair: J.-Chin HAN	
	Keynote	<a href="#">Experimental Turbine Aero-Heat Transfer Studies in Rotating Research Facilities</a> <i>Cengiz CAMCI</i>
	56-FC	<a href="#">Mixing of Air and CO<sub>2</sub> Study on a Turbine Blade</a> <i>Yavuz Hakan ÖZDEMİR, Seyfettin BAYRAKTAR, Tamer YILMAZ</i>
	57-FC	<a href="#">Investigation of Film Cooled Rough Surfaces Using Large Eddy Simulation</a> <i>Prasad KALGHATGI, Sumanta ACHARYA</i>
	64-FC	<a href="#">The Effect of Embedded Vortices on Film Cooling with Compound Angle Orientations</a> <i>Hyo Kyung CHUNG, Young-Su NA, Joon Sik LEE</i>

17.00 – 17.20 Coffee Break

17.20- 19.00	<b>Session 14</b> Chair: L. S. LANGSTON	
	36-SA	<a href="#">A Novel Method for the Computation of Conjugate Heat Transfer with Coupled Solvers</a> <i>Tom VERSTRAETE, Rene Van den BRAEMBUSSCHE</i>
	48-SA	<a href="#">Application of Artificial Neural Network (ANN) Method to Exergetic Analyses of Gas Turbines</a> <i>Yilmaz YORU, T. Hikmet KARAKOC, Arif HEPBASLI</i>

19.00 - 19.10 Closing Remarks