COMPACT CURRICULUM VITAE

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PERSONAL DATA
Citizenship: United States of America
Marital Status: Married.
Languages: German, English

1. EDUCATION

Dr.-Ing. (Pd.D.), 1978, Technical University Darmstadt, Germany, Department of Mechanical Engineering.
Dipl.-Ing. (M.S), 1970, Technical University Darmstadt, Germany, Department of Mechanical Engineering.
Dipl.-Vorprüfung (B.S.), 1967, Technical University Darmstadt, Germany, Department of Mechanical Engineering.

2. EXPERIENCE IN TURBOMACHINERY RESEARCH AND DEVELOPMENT

2.1 Industrial Experience, Gas Turbine Systems and Components R&D

1979-May 1987 (1987 I joined Texas A&M Univ.): ABB, former Brown Boveri & Cie (BBC), Gas Turbine Division, Baden Switzerland. General industrial experience in the gas turbine department, special industrial experience in the area of gas turbine systems and component aerodynamics and design. Group chief and project leader-in-charge of aerodynamic design of multi-stage turbine and compressor components of power generation gas turbine systems, GT8, GT13, and Compressed Air Energy Storage Facility (CAES) Soyland as well as the transonic compressor for gas turbine type GT-8.
1986-1987: Group Chief of Turbomachinery Aerodynamics in BBC Gas Turbine Division, I developed a new compressor loss system with the corresponding computer code for aerodynamic design of transonic compressors stages for the Brown Boveri advanced gas turbine engines.
1985-1986: Group leader, I conducted the investigation of cooled turbine blades for BBC- new generation of gas turbines. I was in charge of optimizing the aerodynamic losses of cooled turbine blades, particularly trailing edge ejection mixing losses of cooled gas turbine blades. I also performed optimization of gas turbine and combined cycle process for BBC- New Gas Turbine Generation and laid down the initial conceptual work for GT24/GT26 engines (see Section 11)
1983-1985: Group leader, I developed the theoretical framework and the corresponding computer program for calculating the dynamic behavior of gas turbine engines and air storage gas turbine systems. In-depth study of the unsteady behavior of gas turbine components, including compressor surge and rotating stall, turbine, and combustion chamber.
1984-1986: Group leader, I developed the modularly structured computer code **BBC-COTRAN** (predecessor of **GETRAN**©) for the dynamic simulation of the single shaft power generation gas turbine engines with arbitrary

component configuration.

1982-1983: Project leader, I performed a fundamental study of the stability of vortex flow and its influence on rotordynamic stability.
1981-1982: Project leader of High Temperature Helium Turbine (HH-Turbine) project, Development of theory and computer program for calculating the turbine stage characteristics of HHT- turbine during catastrophic accidents that lead to a flow reversal as a result of loss of blading.
1980-1981: Project leader, Theoretical investigation of the off-design performance of HH-Turbine, I established a numerical method for calculation of part load behavior of the HH- gas turbines system.
1979-1980: Project leader, Experimental and Numerical Studies of Double-Entry Radial-to-Axial Inlet Casing for High Temperature Helium Nuclear Turbine (HHT). As the project leader- in- charge, I designed an experimental rig and conducted a joint experimental research with Brown Boveri research centers ZX and the KLR, this research lead to the design of a highly efficient Double-Entry Radial-to-Axial inlet with a very uniform axial exit flow distribution.

2.2 Turbomachinery Research Experience in Academic Environment

I have established a strong turbomachinery performance research program and the *Turbomachinery Performance and Flow Research Laboratory*, ***TPFL***, which did not exist before I joined TAMU. It includes experimental research facilities for fundamental and applied research as specified below.

2.2.1 Fundamental Experimental and Theoretical Research in the area of Unsteady Turbine Cascade Flow, Heat Transfer, and Performance

I have developed and designed a large scale, high subsonic unsteady turbine cascade research facility for investigating the complex unsteady flow effects on turbine and compressor blade aerodynamics. This facility is in full operation and has attracted strong interests of DOE, NASA Lewis Research Center and General Electric leading to major grants (See Sections 3.4, 4, and 7).

2.2.2 Fundamental Experimental and Theoretical Research in the Area of Unsteady Aerodynamics, Heat Transfer

I designed and developed a large scale unsteady flow experimental research facility to perform fundamental research in unsteady flow boundary layer research. The research projects executed on this facility have been funded by NASA Lewis Research Center and General Electric (See Sections 3.4, 4, and 7)

2.2.3 Applied Turbine Rig Aerodynamics, Performance, and Heat Transfer Research

To address the major turbine performance and flow research issues, I developed and designed a state-of-the-art three-stage multi-purpose turbine research facility with a versatile turbine engine as its core component. The facility is capable of radially and 90^0 circumferentially traversing the flow at three axial positions and radially at seven positions. Furthermore, the stator rings can be clocked individually to obtain an optimum clocking position. The unique design of the turbine facility allows accurately measuring the efficiency, performance, and mapping the entire interstage flow filed at three axial stations. Flow field and the turbulence structure are measured with five-hole probes, triple and x-wire probes. I design, developed, supervised the manufacturing, and installed the engine within a record time of one year. The facility is in full operation since December 1997. Performance and interstage flow research were performed on two sets of high efficiency blades. For establishing the research facility and conducting the aerodynamic investigations, I received a major grant (See 7, Research Grants). Several issues such as unsteady rotor-stator interaction, unsteady boundary layer transition (with surface mounted hot film on stator and rotor blades), secondary flow loss reduction by using highly 3-D blades are planed to be investigated.

For a very recent DOE-project, I designed a completely new and highly advanced three-stage turbine component with two independently controlled, concentric coolant loops that provide the necessary mass flow for film cooling and heat transfer experiments.

2.3 Computational Propulsion Simulation Research

In connection with a major research grants from NASA Lewis Research Center, I have established a Computational Propulsion Simulation Research and developed the computational platform "Generic Nonlinear Computer Code for

Dynamic Simulation of Transient Behavior of High Performance Core Engines, GETRAN (See Sections 3.4, 4, and 7). The code is capable of dynamically simulating a multi-spool high performance core engines under any dynamic conditions including adverse rotating stall and surge.

3. ACADEMIC EXPERIENCE

Texas A&M: May, 1987 I joined Texas A&M University and am currently full Professor of Mechanical Engineering Department, Texas A&M University and I direct the *Turbomachinery Performance and Flow Research Laboratory*, *TPFL*.
Visiting Professor: June 01, 2013 to September 01, 2013, Visiting Professor at the German Technical University Darmstadt, Turbomachinery Laboratory, Host: Professor Pelz..
Visiting Professor: August, 2001 to July 2002, Visiting professor at the German Technical Universities Berlin, Darmstadt, Dresden, Munich. Research areas: Turbomachinery Unsteady Aerodynamics, Nonlinear Dynamic Performance, Heat Transfer, Hosts Professor B. Stoffel, Chair of Turbnomachinery Institute, Professor Hennecke, Chair of Institute for Gas Turbine Propulsion Systems.
Visiting Professor: June 01, 2006 to September 01, 2006, Visiting professor at the German Technical University Darmstadt, Turbomachinery Laboratory, Host: Professor Stoffel.
Pre-Industrial Academic Activities: September, 1970-September, 1979: Research Assistant and Lecturer at Technical University Darmstadt, Germany, Department of Mechanical Engineering, Turbomachinery Laboratory.

3.1 Graduate Courses Taught/Teaching

Power Plants	MEEN-603
Fluid Mechanics	MEEN-621 (I restructured the course)
Advanced Fluid Mechanics	MEEN-622 (I developed the course, **see 4.0, Textbooks**)
Aero-Thermodynamics of Turbomachinery	MEEN-646 (I developed the course, **see 4.0, Textbooks**)
Gas Turbine Design	MEEN-XXX (being developed)
Turbomachinery Flow Research	MEEN-691

Special Topics in Turbomachinery taught at the Technical University Darmstadt, Germany.

3.2 Undergraduate Courses Taught/Teaching

Thermodynamic II	MEEN-328
Fluid Dynamics	MEEN-344
Fluid Dynamics Lab	MEEN-345
Fluid Dynamics and Heat Transfer	MEEN-346
Fluid Dynamics Laboratory	MEEN-404
Principles of Turbomachinery	MEEN-414
Thermal System Design	MEEN-421

3.3 Teaching Evaluation:

Excellent teaching evaluations for graduate and undergraduate courses throughout my nine years of teaching activities.

3.4 Student Graduation, Supervision

A. Doctorate

1 John, J., "A Study of the Development of Steady and Unsteady Turbulent Wakes through Curved Channels at Positive, Zero, and Negative Streamwise Pressure Gradients," graduated, December, 1993.
2 Attia, M., "Development of a Generic Modularly Structured Computer Code for the Simulation of Transient Behavior of Single-and Multi-Spool High Pressure Core Engines, Turbofan Engines, and Power generation Gas Turbine Engines," graduated, May, 1995m currently **a full Professor at Florida Aeronautical University**.
3 Pappu, K., "Experimental and Theoretical Investigations of the Effect of Unsteady Flow on Turbine Blades

Aerodynamics and Heat Transfer," graduated: May 1998.

4 Chakka, P., "Theoretical and Experimental Research on Unsteady Boundary Layer transition," passed final defense, graduated: December 1998, **Currently, Senior R&D Engineer at P&W Aircraft Engines, USA.**

5 Greendyke, R., "GETRAN-3D: Development of a Generic Modularly Structured Computer Code with Three-Dimensional External Modules for a Detailed Simulation of Dynamic Behavior of Single- and Multi-Spool Core Engines and Power generation Gas Turbine Engines," graduated: December 1998, currently **Associate Professor at UT-Tyler.**

6 Heinke, W. Experimentelle Untersuchungen zum Clocking-Effekt an einer stationären Stator-Stator-Anordnung." Technische Universität Darmstadt, TUD, Germany, Public Defense: June 18, 2002. I shared the supervision of Mr. Heinke with Prof. B. Stoffel at Turbomachinery Laboratory, TUD.

7 Ozturk, B., "Experimental Study of the Combined Effects of Turbulence and Periodic Unsteady Wake Flow on Boundary layer Separation and Re-attachment of Low pressure Turbines Blades," graduated.

8 Suryanarayanan, Arun, "Experimental and theoretical Investigations on a Three-Stage High Pressure Turbine," graduated.

9 Sven König, " Effect of Stator Clocking on Efficiency of a Multi-stage Turbine," Started September 2005, graduated. Technical University Darmstadt (TUD), Germany, I shared the supervision of Mr. Dr. König with Prof. B. Stoffel, Chair of Turbomachinery Laboratory, TUD.

10 Abdel-Fatah,S., " Efficiency and Performance Measurement and comparison with CFD-results of a Three-Stage High Efficiency HP-Turbine," an ongoing three year project, started March, graduated, currently **Senior R&D Engineer, General Electric Aircraft Engine**, Compressor Division..

11 Hicham Chibli, "Efficiency and Performance Measurement of a Three-Stage High Efficiency HP-Turbine," A three year project, to graduate in May 2014.

12 Kun Lu, "Effect of Endwall Contouring on Efficiency and Performance of High Pressure Turbines, "a very recent DOE-project started October 01, 2009, a three year project

13 Mohsen Rezsoltani., "Experimental Investigations of Endwall and Tip Clearance Secondary flow in a Three Stage Turbine, a very recent DOE-project started October 01, 2011, a three year project

14 Nikparto, A., Started Summer 2012, "Numerical and Experimental Investigations of Aerodynamics and Heat Transfer of a highly Loaded Turbine Cascade under Unsteady Flow condition." Started Summer 2012.

15 Ghoraishi, M. Design, Numerical Optimization Experimental Investigations of Stator Internal Combustion Unit for Ultra-high Efficiency Gas Turbine Engines, Started Fall 2012

B. Masters

1 Pardivala, D., "Establishment of a Research Facility for Investigating the Effects of Unsteady Inlet Flow, Pressure Gradient and Curvature on Boundary Layer development, Wake development and Heat Transfer," graduated December, 1991. **Currently President of Sulzer-Hickam Industries, North, Middle and South America.**

2 Pappu, K., "Prediction of Characteristics of Two Dimensional Turbulent Wakes Under the Influence of Streamline Curvature and Zero, Positive and Negative Pressure Gradients," graduated December, 1993.

3 Radke, R., "Effect of Periodic Unsteady Wake Flow and Pressure Gradient on Boundary Layer Transition Along the Concave Surface of a Curved Plate," graduated May, 1994.

4 Huynh, L. "An Empirical Model for the Mean Velocity Profiles of a Turbulent Boundary Layer Under Effects of Surface Curvature," graduated May, 1994.

5 Goy, M., "Development of a Supersonic Nozzle for Integration into the Engine Simulation Code GETRAN," graduated August, 1994.

6 Lippke, C. "Component Development for GETRAN, a Generic Modularly Structured Computer Code for the Simulation of Transient Behavior of Single- and Multi-Spool High Pressure Core Engines, Turbofan Engines and Power Generation Gas Turbine Engines," he is currently working with turbomachinery industry.

7 Read, K., "Aerodynamics and Heat Transfer Investigations Along a Curved Plates Under Different Unsteady Flow Conditions and Pressure Gradients," graduated: August, 1996.

8 Wright, L., "Effect of Periodic Unsteady Wakes on Boundary Layer and Heat Transfer on a Curved Plate," graduated: May, 1996.

9 Abdel-Fatah,S., "Experimental and Theoretical Investigations on a Three-Stage High Pressure Turbine," graduated , August 2003.

10 Özturk, B., "Experimental Study of the Effcet of Periodic Unsteady Wake Flow Separation in Low pressure Turbines," graduated August 2003.
11 Atul Tambi, "Numerical Simulation of Aeodynamic Performance of a Three-stage HP-Turbine, " Started January, 2007.
12 Sharma, K., "Numerical Studies of a Two- stage HP-Turbine, " Started August, 2009, graduated January, 2011.
13 Abdollahi, B., Started Fall 2014 "Graphic Interface for Turbine Streamline Curvature Computer code"
14 Nevin, K: Started Fall 2014,"Development of a design code for a multi-stage compressor aith graphic interface"
15 Widiatto, E. Started Fall 2014, "Graphic Interface for Turbine Streamline Curvature Computer code"

C. Master Students from Germany, Switzerland and Austria

1 Ducrest, L., Diplomarbeit: "Optimization of a Trailing Edge Ejection of a High Pressure Turbine Cascade," full support by the **Swiss Federal Institute of Technology,** graduated August, 1995.
2 Inderbitzin, A., Diplomarbeit:"Development of a Row-by-Row Compressor Module with Adjustable Stator Blade for Integration into the Dynamic Engine Simulation Code GETRAN," full support by the **Swiss Federal Institute of Technology**, graduated: May, 1996.
3 Hauser, M., Diplomarbeit:"Aerodynamic Interaction of Cooling Flow and the Primary Flow on Suction and Pressure surface of a Turbine Cascade under Unsteady Flow Condition, full support by the **Swiss Federal Institute of Technology**, Zürich, graduated August 1998.
4 Douzdouzani, A.,Diplomarbeit: "Berechnung des dynamischen Verhaltens einer mehrwelligen Gasturbine mit GETRAN," Full support by the **Technische Universität Wien, Austria**, graduated August 1998.
5 Groh, A.," Diplomarbeit: Interaction of Turbine Film Cooling Aerodynamics with Unsteady Inlet Flow," full support by the German, **Technische Hochschule Darmstadt**, graduated: August, 1998.
6 Faehndrich, Ch., Diplomarbeit: "Dynamic Simulation of Ultra-High Efficiency Gas Turbine Engines," full support by the **Swiss Federal Institute of Technology, Zürich**, graduated August 1999.
7 Neuenschwander, Th., Diplomarbeit: "Design point Flow Field Investigations on a Three-Stage Turbine," full support by the **Swiss Federal Institute of Technology, Zürich**, joined me October 1999.
8 Jerman, Ch., Diplomarbeit: "Off-design Performance and stator Clocking on Three-Stage Turbine," full support by the **Swiss Federal Institute of Technology, Zürich**, joined me October 1999.
9 Robert Entlesberger, Diplomarbeit: "CFD-Simulation of the Unsteady Flow Through a Low Pressure Turbine Cascade under Periodic Unsteady Wake Flow Condition," Research is supported by the German, **Technische Universität Munich,** started December 200, completed.
10 Till Eikmeier, "Experimental Investigations of Low Pressure Turbine Cascade Boundary Layer under Periodic Unsteady Wake Flow Conditioon. Research is supported by the German," **Technische Universiaet Darmstadt**, started December 2002.
11 Stephan Alfs, Ozturk, B.," Experimental Study of the Combined Effects of Turbulence and Periodic Unsteady Wake Flow on Boundary Layer Development along a Curved Plate under zero-Steamwise Pressure Gradient," Research is supported by the German, **Universität Bochum**, graduated.
12 Storm, Mira, "Experimental, Study of the Combined Effects of Turbulence and Periodic Unsteady Wake Flow on Heat Transfer along a Curved Plate under Zero-Steamwise Pressure Gradient," Research is supported by the German, **Universität Bochum**, completed.
13 Bensing, Dennis, "Experimental Study of the Combined Effects of Turbulence and Periodic Unsteady Wake Flow on Heat Transfer along Suction and Pressure Surfaces of a Low pressure Turbines Blades," **Universität Bochum**, completed.
14 Müller, Martin, Dennis, "Experimental Study of the Combined Effects of Turbulence and Periodic Unsteady Wake Flow on Heat Transfer along Suction and Pressure Surfaces of a Highly Loaded Turbines Blades under Variation of Reynolds Number," **Technical University Darmstadt**, graduated, September 2005.
15 Kegali, Martin, "Measurement of Pressure and Heat Transfer Coefficient Distributions along a Highly Loaded Turbine Blade under Periodic Unsteady Wake Flow Using Pressure and Temperature Sensitive Paints and Liquid Crystal Technique," **Technical University Darmstadt**, graduated September, 2006.
16 Alex Sauerhöfer, " Measurement of Shear Stress Distribution along a Highly Loaded Turbine Blade under Unsteady

Flow Condition Using Surface Mounted Hot Films,"**Technical University Darmstadt**, graduated September 2006.

4. PUBLICATIONS

4.0 Textbooks

1 Textbook, Author: Meinhard Schobeiri, "**Turbomachinery Flow Physics and Dynamic Performance**," Springer-Verlag, New York, Berlin, Heidelberg, ISBN 3-540-22368-1. First edition.
2 Textbook, Author: Meinhard Schobeiri, **Turbomachinery Flow Physics and Dynamic Performance**, Second and Enhanced Edition, 725 pages with 433 Figures, Springer-Verlag, New York, Berlin, Heidelberg, ISBN 978-3-642-24675-3, library of congress 2012935425 published 2012
3 Textbook, Author: Meinhard T. Schobeiri: **Fluid Mechanics for Engineers, Graduate Textbook**, Springer-Verlag, New York, Berlin, Heidelberg, ISBN 978-642-1193-6 published 2010.
4 **New Textbook**, Author: Meinhard T. Schobeiri: **Engineering Applied Fluid Mechanics, Graduate Textbook**, publisher McGraw Hill, Printing on the market since January 15, 2014.
5 In process: Author: Meinhard T. Schobeiri, **Gas Turbine Design: Components, System Integration, Design and Off-Design Performance**." The book is in development planed to be finished by the end of 2015
6 In cooperation with Professor Spurk, I translated the book: Fluid Mechanics Problem Solution for Graduate Fluid Mechanics authored by prof. Spurk. It was published 1997.

4.1 Journal Papers

A. Very Recent Journal Publication

Rezasoltani, M., **Schobeiri, M.T.** and Han, J.C., 2015 "A Combined Experimental and Numerical Study of the Turbine Blade Tip Film Cooling Effectiveness Under Rotation Condition," ASME Transactions, *Jornal of Turbomachinery* 2014; 136(9):091009-091009-10. TURBO-13-1256 doi: 10.1115/1.4027196

Rezasoltani, M., **Schobeiri, M.T.** and Han, J.C., 2014, " Experimental Investigation of the Effect of Purge Flow on Film Cooling Effectiveness on a Rotating Turbine with Non-Axisymmetric Endwall Contouring," ASME, Transaction *Journal of Turbomachinery* , 2014; 136, 136(9):091009-091009-10. TURBO-13-1256 doi: 10.1115/1.4027196.

Schobeiri, M.T., Kun, L., 2013, "Endwall Contouring Using Continuous Diffusion, a Breakthrough Method and its Application to a Three-stage High Pressure Turbine." ASME-Transactions *Journal of Turbomachinery*, 2013; 136(1):011006-011006-10, TURBO-12-1081 doi: 10.1115/1.4023970

Rezasoltani, K. Lu and M.T. **Schobeiri, M.T.**, 2014, " A Combined Experimental and Numerical Study on Turbine Blade Tip Film Cooling Effectiveness under Rotating Condition," In Press, ASME, Transaction *Journal of Turbomachinery*.

Schobeiri, M.T. and Abdelfattah, S., 2013" On the Reliability of RANS and URANS Numerical Results for HP-Turbine Simulations: **A Benchmark Experimental and Numerical Study** on Performance and Interstage Flow Behavior of High Pressure Turbines at Design and Off-Design Conditions Using Two Different Turbine Designs," **A Combined (Experimental and Numerical Study published** in the ASME, Transaction, *Journal of Turbomchinery*, Vol. 135, No. 6. 061012-1 061012-12

Schobeiri, M.T., Abd-elfattah, S., and Chibli, H., 2012, a major Paper " Investigating the Cause of Computational Fluid Dynamics Deficiencies in Accurately Predicting the Efficiency and Performance of High Pressure Turbines: **A Combined Experimental and Numerical Study**" ASME Transactions, *Journal of Fluids Engineering* , Vol. 134 pg. 101104-1-101104-12.

Selected for Frontier in Aerospace Engineering

Schobeiri, M.T., 2014, " Numerical Investigation of the Effect of Purge Flow on Aerodynamic Performance and Film Cooling Effectiveness on a Rotating Turbine with Non-axisymmetric Endwall Contouring." *Frontiers in Aerospace Engineering* in press.

Schobeiri, M.T., 2014, "Experimental and numerical investigations of aerodynamic behavior of a three-stage high-pressure turbine at different operation conditions." *Frontiers in Aerospace Engineering,* in press

Journal Publications (continued)

König, S., Stoffel, B., **Schobeiri, M.T.**, 2009, "Experimental Investigation of the Clocking Effect in a 1.5-Stage Axial Turbine—Part I: Time-Averaged Results," ASME Transactions, Journal of Turbomchinery, Vol. 131 / 021003-12.

König, S., Stoffel, B., **Schobeiri, M.T.**, 2009, "Experimental Investigation of the Clocking Effect in a 1.5-Stage Axial Turbine—Part I: Unsteady Results and Boundary Layer Behavior," Turbomchinery, Vol. 131 / 021003-12.

Schobeiri, M. T., 2008, " Influence of Curvature and Pressure Gradient on Turbulent Wake Development in Curved Channels," ASME Transactions, *Journal of Fluids Engineering* , Vol. 130 / 091201, pp.1-14

Suryanarayanan, A., Mhetras, S.P. **Schobeiri, M.T** and Han, J.C , 2009, "Film-cooling effectiveness on a Rotating Blade Platform," published in the ASME Transactions, *Journal of Turbomachinery*, January 2009, Vol. 131 / 011014-1.-12

Suryanarayanan, A., Özturk, B., **Schobeiri, M.T** and J.C. Han, 2010, " Film-cooling Effectiveness on a Rotating Turbine Platform Using Pressure Sensitive Paint Technique," in press for publication in the ASME Transaction, *Journal of Turbomachinery*, October 2010, Vol. 132 / 041001-1-13.

Schobeiri, M.T., 2008, " Effect of Periodic Unsteady Wake Flow and Turbulence Intensity on Heat Transfer of a Highly Loaded Turbine Blade," recommended for the publication in *International Journal or Rotating Machinery*.

Yang1, Z. Gao2, H.C. Chen3, J.C. Han2 and **M.T. Schobeiri,** 2007," Prediction of Film Cooling and Heat Transfer on a Rotating Blade Platform with Stator-Rotor purge and Discrete Film-Hole Flows in a 1- ½ Turbine Stage," recommended for Publication in ASME-Transactions, *Journal of Turbomachinery*

Ahn, J.Y., **Schobeiri,** M.T., Han, J.C., and Moon, H.K.,2006 "Effect of rotation on leading edge region film coolingof a gas turbine blade with three rows of film cooling holes," *International Journal of Heat and Mass Transfer*, 50 (2007), pp. 15-25.

Skoda, R., Schilling, R., **Schobeiri M.T**, 2007 "Numerical Simulation of Transitional and Unsteady Flow through
a Low Pressure Turbine," published in the *International Journal of Rotating Machinery* Volume 2007, Article ID 10940, 1-11.

Schobeiri, M.T., Özturk, B., Kegali, M, Benzing, D., 2008, "On the Physics of Heat Transfer and Aerodynamic Behavior of Separated Flow along a Highly Loaded Low Pressure Turbine Blade under Periodic Unsteady Wake Flow and Varying of Turbulence Intensity, Part I, Part II, published in ASME Transactions, *Journal of Heat Transfer* , May 2008, Vol. 130/ 051703-1 to 051703-120 (20 pages) .

Schobeiri, M.T., Özturk, B., Ashpis, D., 2007, "Effect of Reynolds Number and Periodic Unsteady Wake Flow Condition on Boundary Layer Development, Separation, and Intermittency Behavior Along the Suction Surface of a Low Pressure Turbine Blade," A combined two part paper: Part I: Boundary Layer Development, Part II: Intermittency Behavior, in press in ASME-Transactions, *Journal of Turbomachinery* , JANUARY 2007, Vol. 129 / 107, pp 92-107 (a major paper).

Özturk, B., 2007 and **Schobeiri, M.T.** " Effect of Turbulence Intensity and Periodic Unsteady Wake Flow Condition on Boundary Layer Development Separation and Re-attachment along the Suction Surface of a Low Pressure Turbine Blade," in press to be published in the ASME Transaction, *Journal of Fluid Engineering*, June 2007, Vol. 129, pp 747-763 (a major paper)

Suryanarayanan, A., Mhetras, S.P. **Schobeiri, M.T** and Han, J.C , 2006, "Film-cooling Effectiveness on a Rotating Blade Platform," in press to be published in the ASME Transactions, *Journal of Turbomachinery.*

Ahn, J.Y., **Schobeiri, M.T.**, Han, J.C., and Moon, H.K., 2006, "Film Cooling Effectiveness on the Leading Edge of a Rotating Film-Cooled Blade Using Pressure Sensitive Paint,"ASME Transactions, *Journal of Heat Transfer*, SEPTEMBER 2006, Vol. 128 pp. 879-888.

Suryanarayanan, A., Özturk, B., **Schobeiri, M.T** and J.C. Han, 2006, " Film-cooling Effectiveness on a Rotating Turbine Platform Using Pressure Sensitive Paint Technique," ASME Transcation, *Journal of Turbomachinery* in press.

Schobeiri, M.T., Öztürk, B., 2004, " Experimental Study of the Effect of Periodic Unsteady Wake Flow on Boundary Layer Development, Separation, and Re-attachment along the Suction Surface of a Low Pressure Turbine Blade," published the ASME Transactions, *Journal of Turbomachinery*, Vol. 126, Issue 4, pp 663-676, a combined

two-part paper of 14 journal pages.

Schobeiri, M.T., B. Öztürk, David E. Ashpis, 2005,"On the Physics of the Flow Separation along a Low Pressure Turbine Blade under Unsteady Flow Conditions in press to be published in ASME Transactions, *Journal of Fluids Engineering*, May 2005, Vol. 127, pp 503-513.

Schobeiri, M.T., B. Öztürk, 2004, "Boundary Layer Separation on Low Pressure Turbine Blade under Unsteady Flow Conditions," recommended for publication in the *International Journal of Rotating Machinery*.

Skoda, R., Schilling, R., **Schobeiri** M.T, "Numerical Simulation of Transitional and Unsteady Flow through a Low Pressure Turbine," accepted for publication in the *International Journal of Rotating Machinery*.

Schobeiri, M.T.Read, K. Lewalle, J.2003, "Effect of Unsteady Wake Passing Frequency on Boundary Layer Transition, Experimental Investigation and Wavelet Analysis,"ASME Transactions, *Journal of Fluids Engineering*, Vol. 125, pp 251-266, a combined two-part paper, this paper received the ASME-2004 FED-Best Paper Award.

Schobeiri, M. T., Wright, L, 2003, "Advances in unsteady boundary layer transition research," Part I: Theory, Modeling, *International Journal of Rotating Machinery*, Volume 9 Number 1 pp, 1-9.

Schobeiri, M. T., Wright, L, 2003, "Advances in unsteady boundary layer transition research, Part II: Experimental Verifications," published in *International Journal of Rotating Machinery*, Volume 9 Number 1 pp, 11-22.

Schobeiri, M. T., Chakka, P., 2002, "Prediction of turbine blade heat transfer and aerodynamics using unsteady boundary layer transition model," *International Journal of Heat and Mass Transfer*, 45 (2002) pp. 815-829.

Schobeiri, M.T., Gilarranz, J.L. Johansen, E. 2002,"Aerodynamic and performance studies of a Three-Stage High Pressure Research Turbine with 3-d - Dlades, Design point and off-design experimental investigations," *International Journal of Rotating Machinery*, in press.

Schobeiri, M.T, Attia, M. 2003, "Active Aerodynamic Control of Multi-stage Axial Compressor Instability and Surge by Dynamically Adjusting the Stator Blades," AIAA-*Journal of Propulsion and Power*, Vol. 19, No. 2, pp 312-317.

Schobeiri, M.T. , 2000, "Active Control of Multi-Stage Axial Compressor Instability and Surge by Dynamically Adjusting the Stator Blades," accepted for publication in AIAA-*Journal of Propulsion and Power*.

Schobeiri, M. T., Pappu, K., 1999, "Optimization of Trailing Edge Ejection Mixing Losses Downstream of Cooled Turbine Blades: A theoretical and Experimental Study," ASME Transactions, *Journal of Fluids Engineering*, 1999, Vol. 121, pp. 118-125.

Chakka, P., **Schobeiri**, M.T. , 1999, "Modeling of Unsteady Boundary Layer Transition on a Curved Plate under Periodic Unsteady Flow Condition: Aerodynamic and Heat Transfer Investigations," ASME Transactions, *Journal of Turbo machinery*, January 1999, Vol. 121, pp. 88-97. **This paper exhibits a break through in unsteady boundary layer transition research area**.

Wright, L., **Schobeiri**, M. T., 1999, "The Effect of Periodic Unsteady Flow on Boundary Layer and Heat Transfer on a Curved Surface," ASME Transactions, *Journal of Heat Transfer*, November 1998, Vol. 120, pp. 22-33. **Schobeiri**, M. T., 1998, "A New Shock Loss Model for Transonic and Supersonic Axial Compressors With Curved Blades," *AIAA, Journal of Propulsion and Power*, Vol. 14, No. 4, pp. 470-478.

Schobeiri, M. T., 1997, "Advanced Compressor Loss Correlations, Part I: Theoretical Aspects," *International Journal of Rotating Machinery*, 1997, Vol. 3, pp. 163-177.

Schobeiri, M. T., 1997, "Advanced Compressor Loss Correlations, Part II: Experimental Verifications," *International Journal of Rotating Machinery*, 1997, Vol. 3, pp. 179-187.

Greendyke, R.B., Paxson, D.E. , **Schobeiri**, M.T. 1997, "Dynamic Simulation of a Wave Rotor Topped Turboshaft Engine,"under review for publication in *AIAA-journal of Propulsion and Power*.

Schobeiri, M. T., Wright., L., Chakka, P., 1998, "Periodic Unsteady Flow Aerodynamics and Heat Transfer Studies on a Curved Surface, Combined Part I and II," in press, *International Journal of Rotating Machinery*.

Schobeiri, M. T., John, J., Pappu, K., 1996, "Development of Two-Dimensional Wakes Within Curved Channels, Theoretical Framework and Experimental Investigation," an honor paper, ASME Transactions, *Journal of Turbomachinery*, July, 1996, Vol. 118, pp. 506-518.

John, J., **Schobeiri**, M.T., 1996, "Development of Two-Dimensional Wakes in a Curved Channel at Positive Pressure Gradient," ASME Transactions, *Journal of Fluid Engineering*, June 1996, Vol 118, pp. 292-299.

Schobeiri, M. T., Pappu, K., 1996, "Zur Auslegung von gekühlten Gasturbinenschaufeln mit optimaler

Hinterkantenausblasung," *Zeitschrift für Konstruktion* (German most prestigious design journal of Springer-Verlag), in press to appear in Vol. 12/96.

Schobeiri, M. T., Attia, M., 1996, "Zur Entwicklung von Berechnungsverfahren zur Simulation dynamischen Verhaltens von Strahltriebwerken und stationären Gasturbinenanlagen," *Journal of Flight Sciences and Space Research (Zeitschrift für Flugwissenschaften und Wetraumforschung)*, 20, (1996), pp. 227-238.

Schobeiri, M. T., Pappu, K., John, J., 1995, "Theoretical and Experimental Study of Development of Two-Dimensional Steady and Unsteady Wakes within Curved Channels," ASME Transactions, *Journal of Fluid Engineering*, December 1995, Vol. 117, pp. 593-598.

Schobeiri, M. T., Abouelkheir, M., Lippke, C., 1994, "GETRAN: A Generic, Modularly Structured Computer Code for Simulation of Dynamic Behavior of Aero-and Power Generation Gas Turbine Engines," an honor paper, ASME Transactions, *Journal of Gas Turbine and Power*, Vol. 1, pp. 483-494.

Schobeiri, M. T., Pappu, K., John, J., 1994, "On the Development of Two-Dimensional Wakes Within Curved Channels: Experimental and Theoretical Investigations," *International Journal of Rotating Machinery*, Vol. 1, No. 1, pp. 19-35.

Schobeiri, M. T., Attia, M, Lippke, C., 1994, "Nonlinear Dynamic Simulation of Single and Multi-spool Core Engines, Part I: Theoretical Method," *AIAA, Journal of Propulsion and Power*, Volume 10, Number 6, pp. 855-862, 1994.

Schobeiri, M. T., Attia, M, Lippke, C., 1994, "Nonlinear Dynamic Simulation of Single and Multi-spool Core Engines, Part II: Modeling and Simulation Cases," *AIAA Journal of Propulsion and Power*, Volume 10, Number 6, pp. 863-867, 1994.

Schobeiri, T., Radke, R.,1995, "Development of Periodic Unsteady Turbulent Wakes in a Curved Channel at Zero Pressure Gradient," *Journal of Flow Visualization*, Vol. 2, No.1, pp. 39-59.

Schobeiri, M. T., Abouelkheir, M., 1992, "A Row-by-Row Off-Design Performance Calculation Method for Turbines," *AIAA, Journal of propulsion and Power*, Vol. 8, Number 4, July-August 1992, pp. 823-826

John, J., **Schobeiri**, M. T., 1993, "A Simple and Accurate Method of Calibrating X-Probes," ASME *Transactions, Journal of Fluid Engineering*, Vol.115, pp. 148-152. **Schobeiri**, M. T., 1990, "The Influence of Curvature and Pressure Gradient on the Temperature and Velocity Distribution," *International Journal of Mechanical Sciences*, Vol. 32, No. 10, pp 851-861, 1990.

Schobeiri, M. T., 1990, "Optimum Design of a Low Pressure Double Inflow Radial Steam Turbine for Open-Cycle Ocean Thermal Energy Conversion," ASME Transaction, *Journal of Turbo machinery*, Vol. 112, pp. 71-77, January 1990.

Schobeiri, M. T., 1990, "Thermo-Fluid Dynamic Design Study of Single- and Double-Inflow Radial and Single-Stage Axial Steam Turbines for Open-Cycle Ocean Thermal Energy Conversion, Net Power Producing Experiment Facility," ASME Transaction, *Journal of Energy Resources*, Vol. 112, pp. 41-50, March 1990.

Schobeiri, M. T., 1989, "Optimum Trailing Edge Ejection for Cooled Gas Turbine Blades," ASME Transaction, *Journal of Turbo machinery*, Vol. 111, No. 4, pp.510-514, October 1989.

Schobeiri, M. T., 1989, "On the Stability Behavior of Vortex Flows in Turbo machinery," (in German) *Zeitschrift für Flugwissenschaften und Weltraumforschung*, 13(1989) pp. 233-239, 1989.

Schobeiri, M. T., "Digital Computer Simulation of the Dynamic Operating Behavior of Gas Turbines," *Journal Brown Boveri Review* Vol. 74, No. 3, March, 1987.

Schobeiri, M. T., 1987, "A Simple Method for Computation of Off-design Performance of the Multistage Turbines," *VDI-Journal, Forschung im Ingenieur Wesen* Bd. 53, Nr. 1, 1987.

Schobeiri, M. T., 1985, "Digital Computer Simulation of the Dynamic Response of Gas Turbines," *VDI-Annual Journal of Turbomachinery*, pp. 381-400, 1985.

Schobeiri, M. T., 1985, "The Influence of Trailing Edge Ejection on the Mixing Losses Behind a Cooled Turbine Blade," *VDI-Journal Forschung im Ingenieurwesen*, Vol. 51, No. 1. pp. 25-28, 1985.

Schobeiri, M. T., "Velocity and Temperature Distribution in Hamel's Spiral Flow," *Journal of Applied Mathematics and Mechanics, ZAMM*, 60, pp. 195-200, 1980.

Schobeiri, M. T., "Approximate Solution to Navier-Stokes Differential Equations in Case of Decelerated and Accelerated Flows Through Two-dimensional Channels Between Convex Walls as Well as Concave Walls," *Journal of Applied Mathematics and Physics, ZAMP* Vo. 27, Fasc. 1, 1976.

Schobeiri, M. T., "Theoretical and Experimental Investigations of Laminar and Turbulent flows in Diffusers," University Press Darmstadt, W-Germany D-17 (1979).

4.2 Book Chapters

Schobeiri, M. T., 2008, "Theory of Turbomachinery Stages," In press, **Handbook of Mechanical Engineering,** Springer Verlag, Berlin, Heidelberg, New York, ISBN-978-540-49131-6..

Schobeiri, M. T., 2008, "Gas Turbine Engines, Design and Dynamic Performance" In press, **Handbook of Mechanical Engineering,** Springer Verlag, Berlin, Heidelberg, New York, ISBN-978-540-49131-6.

Schobeiri, M. T., 2006, "Advances in Unsteady Aerodynamics and Boundary Layer Transition," Published in W.I.T. Book, United Kingdom: FLOW PHENOMENA IN NATURE, Vol. 2, pp. 573-605

Schobeiri, M. T., 1996, "Advanced Compressor Loss Correlations, Part II: Experimental Verifications," presented at the 5th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery, February 25-28, 1996 in Hawaii.

Schobeiri, M. T., "On the Development of Two-Dimensional Wakes Within Curved Channels, Part I: Theoretical Frame Work," Proceedings of Colloquium on Turbo machinery-1994, Turbo and Power Research Center Seoul National University, pp. 285-299, 1994.

Schobeiri, M. T., "On the Development of Two-Dimensional Wakes Within Curved Channels, Part II: Experimental Investigations, Comparison with Theory," Proceedings of Colloquium on Turbo machinery-1994, Turbo and Power Research Center Seoul National University, pp. 300-336, 1994.

Schobeiri, M. T., "On the Development of Two-Dimensional Wakes Within Curved Channels, Part III: Development of Periodic Unsteady Turbulent Wakes Within Curved Channels at Zero Streamwise Pressure Gradient," Proceedings of Colloquium on Turbo machinery-1994, Turbo and Power Research Center Seoul National University, pp. 337-363, 1994.

Schobeiri, M. T., "Simulation of Unsteady Behavior of Gas Turbines," Dynamic and Design of Rotating Machinery, Volume 2, Hemisphere Publishing Corporation, New York, Washington, Philadelphia, London, pp. 408-421, 1990.

Schobeiri, M. T., "Innovative Turbine Design for Open Cycle Ocean Thermal Energy Conversion Systems," will be published in Dynamic and Design of Rotating Machinery, Hemisphere Publishing Corporation, New York, Washington, Philadelphia, London, pp. 535-554, 1992.

4.3 Peer Reviewed Conference Publications

K. Lu, M. Rezasoltani, M.T. **Schobeiri**, and J.C. Han, 2014, "A Combined Numerical and Experimental Study of the Effect of Non- Axisymmetric Contouring on Performance and Film Cooling Behavior of a Rotating Turbine Endwall". Proceedings of ASME Turbo Expo 2014: Power for Land, Sea and Air, GT2014, June 16-20, 2014, Dösseldorf, Germany, GT2014-25659.

M. Rezasoltani, K. Lu, M.T. **Schobeiri** and J.C. Han, 2014," Turbine Blade Tip Film Cooling Effectiveness under Rotation Condition," Proceedings of ASME Turbo Expo 2014: Turbine Technical Conference and Exposition, GT2014 25625, June 16 – 20, 2014, Düsseldorf, Germany

Kun, L., **Schobeiri, M.T.**, and Han, J.C, 2013, "Numerical Simulation of Film Cooling on Rotating Blade Tips within a High-Pressure Turbine. Proceedings of ASME Turbo Expo 2013: Power for Land, Sea and Air, Paper GT2013-39806, June 3-7, 2013, San Antonio, Texas, USA.

Rezasoltani, M., **Schobeiri**, M.T. and Han, J.C., 2013, "Experimental Investigation of the Effect of Purge Flow on Film Cooling Effectiveness on a Rotating Turbine with Non-Axisymmetric Endwall Contouring," Proceedings of ASME Turbo Expo 2013: Power for Land, Sea and Air, Paper GT2013-9480, June 3-7, 2013, San Antonio, Texas, USA.

Kun, L., **Schobeiri,** M.T., and Han, J.C, 2012, "Numerical Investigation of the Effect of Purge Flow on Aerodynamic Performance and Film Cooling Effectiveness on a Rotating Turbine with Non-Axisymmetric Endwall Contouring, Proceedings of ASME Turbo Expo 2012: Power for Land, Sea and Air, Paper GT2012-69069 June 11-15, 2012, Copenhagen, Denmark

Schobeiri, M.T. and Lu, K., 2012, "Advances in Endwall Contouring Using Continuous Diffusion Method and its Application to a Three-Stage High Pressure Turbine, presented at 14th International Symposium on Transport

Phenomena and Dynamics of Rotating Machinery, ISROMAC-14, February 27th - March 2nd, 2012, Honolulu, HI, USA

Schobeiri, M.T. and Kun L., 2011, " Endwall Contouring Using Continuous Diffusion, a Breakthrough Method And its Application to a Three-stage High Pressure Turbine," ASME-Paper GT2011-4593, presented at the Proceedings of ASME Turbo Expo 2011, GT2011 June 6-10, 2011, Vancouver, British Columbia, Canada.

Abdelfattah, S., Chibli, H. and **Schobeiri, M.T.**, 2011, "Aerodynamic Investigation of the Performance of a Two Stage Axial Turbine at Design and Off-design Conditions," ASME-Paper GT2011-45909, presented at the Proceedings of ASME Turbo Expo 2011, GT2011 June 6-10, 2011, Vancouver, British Columbia, Canada.

Abdelfattah, S., and **Schobeiri, M.T.**, 2010, "Experimental and Numerical Investigations of Aerodynamic Behavior of a Three-stage Hp-turbine at Different Operating Conditions," ASME-Paper GT2010-23564, presented at the Proceedings of ASME Turbo Expo 2010, June 14-18, 2010, Glasgow, UK.

Chibli, H. A., Abdelfattah, S. A. and **Schobeiri, M.T.** , 2009: "An Experimental and Numerical Study of the Effects of Flow Incidence Angles on the Performance of a Stator Blade Cascade of a High Pressure Steam Turbine," Proceedings of ASME TURBO EXPO 2009 June 8-12, 2009, Orlando, Florida, USA, GT-2009-59131

Schobeiri, M.T., 2008, " Effect of Periodic Unsteady Wake Flow and Turbulence Intensity on Heat Transfer of a Highly Loaded Turbine Blade," Presented at The 12th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery Honolulu, Hawaii, February 17-22, 2008, the paper is recommended for the publication in International Journal or Rotating Machinery.

Yang1, Z. Gao2, H.C. Chen3, J.C. Han and **M.T. Schobeiri,** 2007," Prediction of Film Cooling and Heat Transfer
on a Rotating Blade Platform with Stator-Rotor Purge and Discrete Film-Hole Flows in a 1- ½ Turbine Stage," ASME Paper, GT-2007-27069 GT-2007-27122,Presented at ASME IGTI TURBO EXPO 200714-17 May 2007, Montreal, Canada also recommended for Publication in ASME-Transactions, *Journal of Turbomachinery*

Öztürk, B. and **Schobeiri, M.T.**, 2006, Combined Effects of Turbulence Intensity and Periodic Unsteady Wake Flow Condition on Boundary Layer Separation and Re-attachment along the Suction Surface of a Low Pressure Turbine Blade", Presented at the Proceedings of ASME Turbo-Expo 2006 Power for Land, Sea and Air, May 8-11, Barcelona, Spain, Paper No. GT2006-91293, recommended for publication in the ASME Transcation, *Journal of Turbomachinery*

Suryanarayanan, A., Özturk, B., **Schobeiri, M.T** and J.C. Han, 2006, " Film-cooling Effectiveness on a Rotating Turbine Platform Using Pressure Sensitive Paint Technique,"Presented at the Proceedings of ASME Turbo-Expo 2006 Power for Land, Sea and Air, May 8-11, Barcelona, Spain, Paper No. ASME-GT-2006-90034, recommended for publication in the ASME Transcation, *Journal of Turbomachinery*

Schobeiri, M.T., Öztürk, B., 2006, " Effects of Turbulence Intensity and Periodic Unsteady Wake Flow Condition on Boundary Layer Separation and Re-attachment along the Suction Surface of a Low Pressure Turbine Blade," Presented at The 11thInternational Symposium on Transport Phenomena and Dynamics of Rotating Machinery Honolulu, Hawaii, March 07-11,2006

Öztürk, B. and **Schobeiri**, M.T., 2005, "Effect of Reynolds Number and Periodic Unsteady Wake Flow Condition on Boundary Layer Development, Separation, and Re-attachment along the Suction Surface of a Low Pressure Turbine Blade," Proceedings of ASME Turbo-Expo 2005, Reno, Nevada, June 6-9, 2005, Paper No. GT2005-68600.

Öztürk, B. and **Schobeiri**, M.T., 2005, "Intermittent Behavior of the Separated Boundary Layer along the Suction Surface of a Low Pressure Turbine Blade under Periodic Unsteady Flow Conditions Proceedings of ASME Turbo-Expo 2005, Reno, Nevada, June 6-9, 2005, Paper No. GT2005-68603.

Schobeiri, M.T., 2005 , "Intermittency Based Unsteady Boundary Layer Transition Modeling, Implementation into Navier-stokes Equations," Proceedings of ASME Turbo-Expo 2005, Reno, Nevada, June 6-9, 2005, Paper No. GT2005-68375.

Ahn, J.Y., **Schobeiri**, M.T., Han, J.C., and Moon, H.K., 2005, "Film Cooling Effectiveness on the Leading edge of a Rotating Film-Cooled Blade Using Pressure Sensitive Paint," Proceedings of ASME Turbo-Expo 2005, Reno, Nevada, June 6-9, 2005, Paper No. GT2005-68344.

Schobeiri, M.T., B. Öztürk, 2004, " Experimental Study of the Effect of Periodic Unsteady Wake Flow on Boundary Layer Development, Separation, and Re-attachment Along the Surface of a Low Pressure Turbine Blade,"

ASME-paper GT2004-53929, Proceeding of ASME Turbo Expo 2004 Power for Land, Sea and Air June 14-17,2004, Vienna, Austria, also accepted for publication in the ASME Transactions, *Journal of Turbomachinery*.

Schobeiri, M.T., Suryanarayanan A., Jermann, C., Neuenschwander, T. 2004,"A Comparative Aerodynamic and Performance Study of a Three-Stage High Pressure Turbine with 3-d Bowed Blades and Cylindrical Blades," ASME-paper GT2004-53650, Proceedings of ASME Turbo Expo 2004, Power of Land Air and Sea, June 14 - 17, 2004, Vienna, Austria

Schobeiri, M.T., B. Öztürk, 2004, "Boundary Layer Separation on Low Pressure Turbine Blade under Unsteady Flow Conditions," ISROMAC 10-Paper 124 Presented at the 10th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery Honolulu, Hawaii, March 07-11,2004

Skoda, R., Schilling, R., **Schobeiri** M.T, "Numerical Simulation of Transitional and Unsteady Flow through a Low Pressure Turbine," Presented at the 10th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery Honolulu, Hawaii, March 07-11,2004 and also for publication in the *International Journal of Rotating Machinery*.

Schobeiri, M.T., B. Öztürk, David E. Ashpis, 2003,"On the Physics of the Flow Separation along a Low Pressure Turbine Blade under Unsteady Flow Conditions," ASME paper: GT2003-38917, Proceeding of ASME Turbo Expo 2003, Power for Land, Sea and Air June 16-19,2003, Atlanta, Georgia, USA

Schobeiri, M. T., 2001," Active Aerodynamic Control of Multi-Stage Axial Compressor Instability and Surge by Dynamically Adjusting the Stator Blades,"ASME-paper: 2001-GT-0479, presented at the ASME, IGTI-Conference, June 4-7, 2001, New Orleans, Louisiana, USA.

Schobeiri, M. T., Gilarranz, J.L, Johansen, E.S., 2000, "Aerodynamic and Performance Studies of a Three Stage High Pressure Research Turbine with 3-D-Blades, Design Points and Off-Design Experimental Investigations,"Presented at the ASME, IGTI-conference, ASME-paper: 2000-GT-484, May 08-11, 2000, Munich Germany.

Chakka, P, **Schobeiri**, M. T.," Scales of Turbulence During the Boundary Transition under Unsteady Flow Conditions, ASME Paper No. 99-GT-221, presented at the ASME, IGTI, International Gas Turbine Congress, in Indianapolis, Indiana.

Schobeiri, M. T., Chakka, P., 1998," Unsteady Wake Effects on Boundary Layer Transition and Heat Transfer Characteristics of a Turbine Blade, ASME Paper No. 98-GT-291, presented at the ASME, IGTI, International Gas Turbine Congress, in Stockholm.

Schobeiri, M. T., Wright., L., Chakka, P., 1998, "Periodic Unsteady Flow Aerodynamics and Heat Transfer Studies on a Curved Surface, Combined Part I and II,"presented at the 5th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery, February 22-26,1998 in Hawaii, U.S.A.

Chakka, P., **Schobeiri**, M.T., 1997, "Modeling of Unsteady Boundary Layer Transition on a Curved Plate under Periodic Unsteady Flow Condition", ASME Paper No. 97-GT-399, presented at the IGTI, International Gas Turbine Congress, in Orlando ASME

Schobeiri, M. T., 1996, "Advanced Compressor Loss Correlations, Part I: Theoretical Aspects," presented at the 5th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery, February 25-28,1996 in Hawaii.

Schobeiri, M. T., 1996, "Advanced Compressor Loss Correlations, Part II: Experimental Verifications," presented at the 5th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery, February 25-28, 1996 in Hawaii.

Schobeiri, M. T., Attia, S., 1996, "Advances in Nonlinear Dynamic Engine Simulation Technology," ASME 96-GT-392, presented at the International Gas Turbine and Aero-Engine Congress and Exposition, Birmingham, UK- June 10- 13, 1996.

Schobeiri, M. T., 1996, "Advanced Compressor Loss Correlations, Part I: Theoretical Aspects," presented at the 5th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery, February 25-28,1996 in Hawaii.

Schobeiri, M. T., 1996, "Advanced Compressor Loss Correlations, Part II: Experimental Verifications," presented at the 5th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery, February 25-28, 1996 in Hawaii.

Schobeiri, M. T., Pappu, K., Wright, L., 1995, "Experimental Sturdy of the Unsteady Boundary Layer Behavior

on a Turbine Cascade," ASME 95-GT-435, presented at the International Gas Turbine and Aero-Engine Congress and Exposition, Houston, Texas, June 5-8, 1995.

Attia, M. S., **Schobeiri**, M. T., 1995, "A new Method for the Prediction of Compressor Performance Maps Using One-Dimensional Row-by-Row Analysis," ASME 95-GT-434, presented at the International Gas Turbine and Aero-Engine Congress and Exposition, Houston, Texas.

Schobeiri, M. T., Read, K., Lewalle, J., 1995, "Effect of Unsteady Wake Passing Frequency on Boundary Layer Transition, Experimental Investigation and Wavelet Analysis," ASME 95-GT-437, presented at the International Gas Turbine and Aero-Engine Congress and Exposition, Houston, Texas, June 5-8, 1995.

Schobeiri, M. T., John, J., Pappu, K., 1994, "Development of Two-Dimensional Wakes Within Curved Channels, Theoretical Framework and Experimental Investigation," ASME 94-GT-367 paper, presented at the International Gas Turbine and Aero-Engine Congress and Exposition in Hague, Netherlands, June 18-16, 1994. The paper was recommended for the publication in ASME Transactions, *Journal of Turbo machinery.*

Schobeiri, M. T., Pappu K., "Theoretical and Experimental Study of Development of Two-dimensional Steady and Unsteady Wakes Within Curved Channels," presented at the ASME Winter Annual Meeting, Mechanical Engineering Congress and Exposition, published in Vol. 40, Unsteady Flows in Aero-propulsion Chicago Il. 1994. This paper was also recommended for journal publication and is published in ASME Transactions, *Journal of Fluid Engineering,* (see 4.1b).

Schobeiri, M. T., John, J., 1994, "Development of Periodic Unsteady Turbulent Wakes in a Curved Channel at Zero Streamwise Pressure Gradient," ASME-paper 94-GT-158, presented at the International Gas Turbine and Aero-Engine Congress and Exposition in Hague, Netherlands, June 18-16, 1994.

Schobeiri, M. T., Radke R., 1994, "Effect of Periodic Unsteady Wake Flow and Pressure Gradient on Boundary Layer Transition Along a the Concave Surface of a Curved Plate," ASME-paper 94-GT-327, presented at the International Gas Turbine and Aero-Engine Congress and Exposition in Hague, Netherlands, June 18-16, 1994.

John, J., **Schobeiri**, M.T., 1994, "Development of Two-Dimensional Wakes in a Curved Channel at Positive Pressure Gradient," ASME-paper 94-GT-384, presented at the International Gas Turbine and Aero-Engine Congress and Exposition in Hague, Netherlands, June 18-16, 1994. This paper was also recommended for journal publication and is being published in ASME Transactions, *Journal of Fluid Engineering,* (See 4.1b).

Schobeiri, M. T., 1994, "On the Development of Two-Dimensional Wakes Within Curved Channels: Experimental and Theoretical Investigations," presented at the 5th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery (ISROMAC-5) in Maui, Hawaii, May 8-11, 1994 Journal. The paper has been published in *the International Journal of Rotating Machinery, Vol. 1, No. 4, PP.1-17.*

Schobeiri, M. T., Abouelkheir, M., Lippke, C., "GETRAN: A GENERIC, Modularly Structured Computer Code for Simulation of Dynamic Behavior of Aero-and Power Generation Gas Turbine Engines," ASME paper: 93-GT-388, presented at the ASME International Gas Turbine Conference in Cincinnati, Ohio, 1993, this paper was also recommended for journal publication and is published as an honor paper in ASME Transactions, *Journal of Gas Turbine and Power,* (See 4.1b).

Schobeiri, M. T., Lippke, C., Abouelkheir, M., "Nonlinear Dynamic Simulation of Single- and Multi-Spool Core Engines," AIAA 93-2580 paper, presented at the 29th AIAA/SAE/ASME/ASEE Joint Propulsion Conference, June 28-30, 1993, Monterey, CA.

Schobeiri, M. T., "One-Dimensional Method for Accurate Prediction of Off-Design Performance Behavior of Axial Turbines," ASME Paper 92-GT-54, presented at the ASME International Gas Turbine Conference in Cologne, June 3-6, 1992.

Schobeiri, M. T., "Development of a Subsonic Flow Research Facility for Simulating the Turbo machinery Flow and Investigating its Effects on Boundary Layer Transition, Wake Development and Heat Transfer," presented at the Fourth International Symposium on Transport Phenomena and Dynamics of Rotating Machinery, April 5-8, 1992.

Schobeiri, M. T., Abouelkheir, M., "A Row-by-Row Off-Design Performance Calculation Method for Turbines," presented at 27th AIAA/SAE/ASME Joint Propulsion Conference in Sacramento, Calif., June 24-27, 1991, the paper was recommended for journal publication and is published in AIAA, *Journal of Propulsion and Power* (See 4.1b).

Schobeiri, M. T., McFarland, E., Yeh, F., "Aerodynamic and Heat Transfer Investigations on a High Reynolds Number Turbine Cascade," ASME paper 91-GT-157, to be presented at the ASME International Gas Turbine

Conference in Orlando, June 3-6, 1991.

Schobeiri, M. T., Dunn, M., "Simple Predictive method for Optimum Thermo Fluid Dynamic Design of Radial Gas Turbines," Fluid Machinery Components, ASME FED-Vol. 101, Presented at the WAM in Dallas Texas, Nov. 1990.

Schobeiri, M. T., "Innovative Turbine Design for Open Cycle Ocean Thermal Energy Conversion Systems," presented at the Third International Symposium on Dynamics and Design of Rotating Machinery, in Hawaii, 1990.

Schobeiri, M. T., "Optimum Design of a Low Pressure, Double Inflow, Radial Steam Turbine for Open-Cycle Ocean Thermal Energy Conversion," ASME paper 89-GT-60, presented at the 34th ASME International Gas Turbine Conference in Toronto, June 4-8, 1989. This paper was recommended for journal publication and is published in ASME Transactions, *Journal of Turbo machinery,* (See 4.1b).

Schobeiri, M. T., "Simulation of Unsteady Behavior of Gas Turbines," presented at the Second International Symposium on Dynamics and Design of Rotating Machinery, in Hawaii, 1988.

Schobeiri, M. T., "General Computer Program for Prediction of Transient Performance of Gas Turbines," ASME-Paper, ASME 86-GT-180, June, 1986.

Schobeiri, M. T., Haselbacher, H., "Transient Analysis of GAS Turbine Power Plant, Using the Huntorf Compressed Air Storage Plant as an Example," ASME-Paper, ASME-85-Gt-197, March, 1985.

4.4 Research Reports for U.S. Government

Schobeiri, M.T. (Project Director), Han, J,C, Co-PI, 2013, **Final Report** "Aerodynamics and Heat Transfer Studies of Parameters Specific to the IGCC-Requirements: Endwall Contouring, Leading Edge Filleting and Blade Tip Ejection under Rotating Turbine Conditions," Advanced Turbine Program, presented at the DOE-UTSR-Conference in Irvine California.

Schobeiri, M.T. (Project Director), Han, J,C, Co-PI, 2012, **Quarterly Report** Part I, II, III, and IV "Aerodynamics and Heat Transfer Studies of Parameters Specific to the IGCC-Requirements: Endwall Contouring, Leading Edge Filleting and Blade Tip Ejection under Rotating Turbine Conditions," Advanced Turbine Program, presented at the DOE-UTSR-Conference in Irvine California.

Schobeiri, M.T. (Project Director), Han, J,C, Co-PI, 2011, Quarterly Report Part I, II, III, and IV "Aerodynamics and Heat Transfer Studies of Parameters Specific to the IGCC-Requirements: Endwall Contouring, Leading Edge Filleting and Blade Tip Ejection under Rotating Turbine Conditions," Advanced Turbine Program.

Schobeiri, M.T. (Project Director), Han, J,C, Co-PI, 2010, Quarterly Report Part I, II, III, and IV "Aerodynamics and Heat Transfer Studies of Parameters Specific to the IGCC-Requirements: Endwall Contouring, Leading Edge Filleting and Blade Tip Ejection under Rotating Turbine Conditions," Advanced Turbine Program, presented at the DOE-UTSR-Conference in Irvine California.

Schobeiri, M.T., 2006, "Final Report on Low Pressure Turbine Aerodynamics Research , NASA Cooperative Agreement, NCC3-793, ongoing project: " Effect of Reynolds Number and Periodic Unsteady Wake Flow Condition on Boundary Layer Intermittency along the Suction Surface of a Low Pressure Turbine Blade."

Schobeiri, M.T., J.C. Han, 2006, "Aerodynamics and Heat Transfer Studies on Blade Platforms with and without Film Cooling," Ongoing project: Peer Review Workshop, DOE-presentation and report, University Turbine Syatem Research, UTSR, SCIES Project 03-01-SR113, Doe Cooperative Agreement De-fc26-02nt41431.

Schobeiri, M.T., 2005, Mid Term Report on Low Pressure Turbine Aerodynamics Research , NASA Cooperative Agreement, NCC3-793, ongoing project: " Effect of Reynolds Number and Periodic Unsteady Wake Flow Condition on Boundary Layer Intermittency along the Suction Surface of a Low Pressure Turbine Blade."

Schobeiri, M.T., J.C. Han, 2005, "Aerodynamics and Heat Transfer Studies on Blade Platforms with and without Film Cooling," Ongoing project: Peer Review Workshop, DOE-presentation and report, University Turbine Syatem Research, UTSR, SCIES Project 03-01-SR113, Doe Cooperative Agreement De-fc26-02nt41431.

Schobeiri, M.T., 2004, Mid Term Report on Low Pressure Turbine Aerodynamics Research , NASA Cooperative Agreement, NCC3-793, " Effect of Reynolds Number and Periodic Unsteady Wake Flow Condition on Boundary Layer Intermittency along the Suction Surface of a Low Pressure Turbine Blade."

Schobeiri, M.T., J.C. Han, 2004, "Aerodynamics and Heat Transfer Studies on Blade Platforms with and without Film Cooling," Peer Review Workshop, DOE-presentation and report, SCIES Project 03-01-SR113, Doe Cooperative Agreement De-fc26-02nt41431.

Schobeiri, M.T., 2004, Mid Term Report on Low Pressure Turbine Aerodynamics Research , NASA Cooperative Agreement, NCC3-793, " Intermittency Based Unsteady Boundary Layer Transition Modeling, Implementation into Navier-Stokes Equations, Experimental Verification."

Schobeiri, M.T., 2003, Final Report, Phase I on Low Pressure Turbine Aerodynamics Research , NASA Cooperative Agreement, NCC3-793, " Effect of Periodic Unsteady Wake Flow Condition on Boundary Layer along the Suction Surface of a Low Pressure Turbine Blade."

Schobeiri, M. T., Attia, M. S., "Final Report on GETRAN ©: The GEneric, Modularly Structured Computer Code for Simulation of the Transient Behavior of Single and Multi-spool Aero and Power Generation Gas Turbine Engines," Volume I: Technical Report, December, 1995.

Schobeiri, M. T., Attia, M. S., Lippke, C., "Final Report on GETRAN ©: The GEneric, Modularly Structured Computer Code for Simulation of the Transient Behavior of Single- and Multi-Spool Aero and Power Generation Gas Turbine Engines," Volume II: User Manual, December, 1995.

Schobeiri, M. T., Attia, M.S., "Final Report on GETRAN ©: The GEneric, Modularly Structured Computer Code for Simulation of the Transient Behavior of Single- and Multi-Spool Aero and Power Generation Gas Turbine Engines," Volume III: Code Organization, December, 1995.

Schobeiri, M. T., John, J., "A Study of the Development of Steady and Unsteady Turbulent Wakes Through Curved Channels at Positive, Zero, and Negative Streamwise Pressure Gradients," NASA Contractor Report 198448, January, 1996.

Schobeiri, M. T., Pappu, K., "Experimental and Theoretical Investigations of the Effect of Unsteady Flow on Turbine Blades Aerodynamics and Heat Transfer," NASA Contractor Report 198449, January, 1996.

Schobeiri, M. T., Radke, R. E., "Effect of Periodic Unsteady Wake Flow and Pressure Gradient on Boundary Layer Transition Along the Concave Surface of a Curved Plate," NASA Contractor Report 198449,January, 1996..

Schobeiri, M. T., "Heat Transfer and Boundary Layer Transition Under Turbo machinery Flow Conditions," Preliminary Report PR-1, NASA Contract NAG 3-1256, 1991.

Schobeiri, M. T., "Completion of the Preliminary Measurements on the Research Facility for Investigating the Effects of Periodic Unsteady Inlet Flow, Pressure Gradient and Curvature on Boundary layer Transition, Wake Development and Heat Transfer," preliminary Report PR-2, NASA Lewis Research Center, NAG 3-1256, 1991.

Schobeiri, M. T., "Turbine Component Development for the Integration into GETRAN," NASA Contract Report NAG-1144, 1991.

Schobeiri, M. T., "GETRAN, a GEneric Modular Structured Computer Code for the Simulation of Transient Behavior of Single- and Multi-Spool High Pressure Core Engines, Turbofan Engines, and Power Generation Gas Turbine Engines," NASA Contract Report NAG-1144, 1990.

Schobeiri, M. T., McFarland, E., Yeh, F., "Aerodynamic and Heat Transfer Investigations on a High Reynolds Number Turbine Cascade," NASA Technical Memorandum 103260, 1990.

Schobeiri, M. T., "Advanced Code Architecture for the Simulation of Multi-Spool Core Engines," NASA Lewis Research Center, December 1990.

Schobeiri, M. T., "Aero-Thermodynamic Design Study of Single Inflow Radial and Single-Stage Axial Steam Turbines for OC-OTEC Net Power Producing Experiment Facility," U.S. Department of Energy, Solar Energy Research Institute, SERI/TR-253-3559, DE89009466.

4.5 Research Reports for Turbomachinery Industry

Schobeiri, M.T., PI, "Development, Design and Efficiency and Performance Test High Efficiency HP-Turbine Blading," Sponsor: Doosan Heavy Industries, Korea, $535k for design tasks a Three-year Project started June 01, 2007.

Schobeiri, M.T., Gilarranz, J., Johansen, E., " Design, Development and Test of High Efficiency Turbine Blades, Final Report on: Efficiency, Performance, and Interstage Flow Field Measurement of Siemens-Westinghouse HP-Turbine Blade Series 9600 and 5600," September, 1999.

4.6 Other Technical Papers and Reports

More than 100+ other relevant conference and technical papers in the field of Turbo machinery. The list will be submitted if requested.

5. COMPUTER CODES DEVELOPED

Schobeiri, M. T., Attia, M. S., "Final Report on GETRAN ©: The GEneric, Modularly Structured Computer Code for Simulation of the Transient Behavior of Single- and Multi-spool Aero and Power Generation Gas Turbine Engines," Volume I: Technical Report, December, 1995.

Schobeiri, M. T., Attia, M. S., Lippke, C., "Final Report on GETRAN ©: The GEneric, Modularly Structured Computer Code for Simulation of the Transient Behavior of Single- and Multi-spool Aero and Power Generation Gas Turbine Engines," Volume II: User Manual, December, 1995.

Schobeiri, M. T., Attia, M. S., "Final Report on GETRAN ©: The GEneric, Modularly Structured Computer Code for Simulation of the Transient Behavior of Single- and Multi-spool Aero and Power Generation Gas Turbine Engines," Volume III: Code Organization, December, 1995.

Schobeiri, M. T., "COTRAN, the Computer Code for Simulation of Unsteady Behavior of Gas Turbines," Brown Boveri Company Gas Turbine Division, Switzerland, BBC-HZX-ST 85021 1985, Classified (Size > 20,000 Statements).

Schobeiri, M. T., "User Guide for COTRAN, Vol. I.," Brown Boveri Company Gas Turbine Division, Switzerland, BBC-HT 520, 1986.

Schobeiri, M. T., "User Guide for COTRAN, Vol. II.," Brown Boveri Company Gas Turbine Division, Switzerland, BBC-HT 520, 1986.

Schobeiri, M. T., "Computer Code for Calculation of Transonic Compressor Losses," Brown Boveri Company Gas Turbine Division, Switzerland, BBC-HTCT-TN-87/20C 1986, (Size > 10,000 Statements).

Schobeiri, M. T., "User Guide for Computer Code for Calculation of Transonic Compressor Losses," Brown Boveri Company Gas Turbine Division, Switzerland, BBC-HTCT-TN-87/20C 1986.

Schobeiri, M. T., "Computer Code for calculation of Compressor Performance Map, Part I," Brown Boveri Company Gas Turbine Division, Switzerland, BBC-HT582C 1986, (Size > 10,000 Statements).

Schobeiri, M. T., "User Guide for Computer Code for Calculation of Compressor Performance Map, Part I," Brown Boveri Company Gas Turbine Division, Switzerland, BBC-HT582C 1986.

Schobeiri, M. T., "Computer Code for Optimum Design of Combined Cycles," Boveri Company Gas Turbine Division, Switzerland, BBC-HTCT-TN-86-112C, 1986.

Schobeiri, M. T., " User Guide for Computer Code for Optimum Design of Combined Cycles," Boveri Company Gas Turbine Division, Switzerland, BBC-HTCT-TN-86-112C, 1986.

6. INVITED SEMINARS AND PRESENTATIONS

Schobeiri, M.T., 2014, "Advances in Turbine Aerodynamics, Performance and Heat Transfer Research," presented at the University of Notre Dame, the Institute, Flow Physics and Control, October 3, 2014, Host: Prof. Scott Morris, UND, Turbomachinery Laboratory.

Schobeiri, M.T., 2014, A Series of three Lecture, Joint Invitation by Department of Thermal Engineering Tsinghua University, Beijing P.R. China, the Chinese Academy of Science and the Chinese Turbomchinery Industry, Host: Professor Dr. Eng. Xin Yuan.

Presentation 1, "Impact of Endwall Contouring Turbine Efficiency, Performance and Heat Transfer."

Presentation 2, "Effect of Blade Tip Film Cooling Hole Geometry of Blade Tip Film Cooling Effectiveness."

Presentation 3, "Advances in Gas Turbine Engines Development, Efficiency and Performance Evolution: Design Aspects, Non-Linear Dynamics Simulation,."

Schobeiri, M.T., 2014" "On the Predicting Capability of RANS and URANS to Predict Advances in Turbine Film Cooling Research, Theory, Modeling and Experimental Verification," Invited: Ruhr University Bochum, Germany, June 19, 2014 to June 20, 2014, Host: prof. V. Scherer

Schobeiri, M,T., 2013, "Deficiencies of RANS-based Numerical Methods for Simulating Aerodynamics and Heat Transfer in High Pressure Turbines," A Major Lecture will be presented at the invitation of ASME-Heat Transfer Committee, International Gas Turbine Institute, ASME-IGTI- Turbo-Expo-2013, date **of Invitation**: August, 2012

Schobeiri, M.T., 2012, "Turbine Aerodynamics and Heat Transfer Research: Discrepancies between Experimental and Numerical Simulations and their causes." presented to Faculty and Graduate Students of Mechanical Engineering Department of Ruhr University Bochum, Germany, June 14, 2012.

Schobeiri, M. T., 2012"Deficiencies of RANS-based Numerical Methods for Simulating Aerodynamics and Heat Transfer in High Pressure Turbines," Graduate Students of TAMU, MEEN, AERO, January 25, 2012

Schobeiri M.T. 2006, " Application of Pressure and Temperature Sensitive Paints in Rotating Turbine Rigs," Presented to at the Technical University Darmstadt, Department of Mechanical Engineering on August 8, 2006

Schobeiri, M. T., " Unsteady Boundary layer Transition and its Impact on Turbine Aerodynamic Design," Presented to Siemens Power Generation, Turbine Design Group, USA, Orlando, August 15, 2003**.**

Schobeiri, M. T., "Non-Linear Gas Turbine System Simulation as the stage of Design to Avoid Future Failure,"Presented to Siemens Power Generation, Turbine Design Group, USA, Orlando, August 15, 2003**.**

Schobeiri, M. T., "Lecture Series: On the State of Unsteady Boundary Layer Transition Research in Turbomachinery" Presented at Technical University Dresden, Berlin, April 01-07, 2002.

Schobeiri, M. T., "Lecture Series: Unsteady Aerodynamics in Turbomachinery" presented at the European Conference on Turbulence Phenomena held Technical University Berlin, November 12-23, 2001.

Schobeiri, M. T., "Advances in Unsteady Boundary Layer Transition Research," presented at the European Conference on Turbulence Phenomena held at the Technical University Berlin, November 12-23, 2001.

Schobeiri, M. T., "Lecture Series: Unsteady Aerodynamics in Turbomachinery" presented at the Technical University Berlin, November 12-23, 2001.

Schobeiri, M. T., "Lecture s Series: Advances in Gas turbine Engine Simulation," presented to Technical University Berlin, November 12-23, 2001.

Schobeiri, M.T., "Zum Stand der Forschung auf dem Gebiete der instationären Grenzschichten," Technische Universität Darmstadt, Institut für Turbomaschinen und Fluidantriebstechnik, Germany, May 08, 2000.

Schobeiri, M.T., "Zum Stand der dynamischen Simulation der Gasturbinenanlage," Technische Hochschule Aachen, Institut für Dampf-und Gasturbinen, Germany, May 16, 2000.

Lecture Series on Gas Turbine Engine Design, Dynamic Simulations, I received 1997 an invitation from Prof. Dr. Haselbacher, Director of Turbomachinery Laboratory, Technical University Wiena, to give a seminar, but because of my commitment to the Westinghouse Project, I was not able to make the trip.

Schobeiri, M. T., "Optimization of Trailing Edge Ejection Mixing Losses: Experimental Study, Theoretical Analysis," presented to General Electric, Power Generation, Schenectady, June 03, 1996

Schobeiri, M. T., "Advances in Dynamic Engine Simulation Code G E T R A N: A GEneric, Modularly Structured Computer Code for Simulation of Dynamic Behavior of Aero- and Power Generation Gas Turbine Engines," presented to General Electric, Power Generation, Schenectady, June 03, 1996

Schobeiri, M. T., "The Role of Dynamic Simulation in Engine Design Process," this invited seminar was presented to a joint special session organized by the German Aerospace Industry MTU and the Technische Hochschule Darmstadt, Germany, June 1995.

Schobeiri, M. T., "Unsteady Flow Research at Texas A&M University, Part I: Boundary Layer Transition Research," "Part II: Steady and Unsteady Wake Development," this invited seminar was presented to a joint special session organized by the German Aerospace Industry MTU and the Technische Hochschule Darmstadt, Germany, June 1995.

Schobeiri, M. T., "On the Development of Two-Dimensional Wakes Within Curved Channels, Part II: Experimental Investigations, Comparison with Theory," Proceedings of Colloquium on Turbo machinery-1994, Turbo and Power Research Center Seoul National University, pp. 300-336, 1994.

Schobeiri, M. T., "On the Development of Two-Dimensional Wakes Within Curved Channels, Part III: Development of Periodic Unsteady Turbulent Wakes Within Curved Channels at Zero Streamwise Pressure Gradient," Proceedings of Colloquium on Turbo machinery-1994, Turbo and Power Research Center Seoul National University, pp. 337-363, 1994.

Schobeiri, M. T., "Advances in Dynamic Engine Simulation," this invited seminar was presented to Turbo and Power Research Center, Seoul National University and the CEO's of Korean Aerospace Industry, 1994.

Schobeiri, M. T., "On the Development of Two-Dimensional Wakes within Curved Channels, Part I: Theoretical Frame Work," Proceedings of Colloquium on Turbo machinery-1994, Turbo and Power Research Center Seoul National University, pp. 285-299, 1994.

Schobeiri, M. T., "On the Development of Two-Dimensional Wakes within Curved Channels, Part II: Experimental Investigations, Comparison with Theory," Proceedings of Colloquium on Turbo machinery-1994, Turbo and Power Research Center Seoul National University, pp. 300-336, 1994.

Schobeiri, M. T., "On the Development of Two-Dimensional Wakes within Curved Channels, Part III: Development of Periodic Unsteady Turbulent Wakes within Curved Channels at Zero Streamwise Pressure Gradient," Proceedings of Colloquium on Turbo machinery-1994, Turbo and Power Research Center Seoul National University, pp. 337-363, 1994.

Schobeiri, M. T., "Development of Two-Dimensional Steady and Unsteady Wakes within Curved Channels; Experimental Approach and Theoretical Frame Work," presented at the Workshop on Inherent Unsteadiness in Compressors and Turbines, October 5, 1993, at Purdue University, invited by USAF, Aerospace Science Directorate, Mr. Daniel Fant.

Schobeiri, T., "Development of Periodic Unsteady Turbulent Wakes in a Curved Channel at Zero Pressure Gradient," presented at the Workshop on Inherent Unsteadiness in Compressors and Turbines, October 5, 1993, at Purdue University, invited by USAF, Aerospace Science Directorate, Mr. Daniel. Fant.

Schobeiri, M. T., "Unsteady Boundary Layer Transition Phenomenon, Progresses," presented at the Boundary Layer Transition Workshop by NASA Lewis Research Center, Internal Fluid Mechanics Division, November, 17-18, 1993, invited by Mr. F. Simon, Deputy Chief and Dr. R. Simoneau, Chief of Heat Transfer Branch, Internal Fluid Mechanics Division, NASA Lewis Research Center.

Schobeiri, M. T., "Status Report on GETRAN, a GEneric Modular Structured Computer Code for the Simulation of Transient Behavior of Single- and Multi-Spool High Pressure Core Engines, Turbofan Engines, and Power Generation Gas Turbine Engines," presented to the scientists of NASA Lewis Research Center, invited by Carl Lorenzo, Chief Systems Dynamics, August, 1992.

Schobeiri, M. T., "Status Report on Unsteady Boundary Layer Transition Phenomenon, Progresses," presented to the scientists of NASA Lewis Research Center, Internal Fluid Mechanics Division, Heat Transfer Branch, Chief Dr. R. Simoneau, August 1992.

Schobeiri, M. T., "Development of a Row-by-Row Turbine Module and for the Integration into GETRAN," presented to scientists of the NASA Lewis Research Center, Advanced Control Technology Branch, Chief Carl Lorenzo, August, 1991.

Schobeiri, M. T., "Design Concept for Development of GETRAN, a GEneric Modular Structured Computer Code for the Simulation of Transient Behavior of Single- and Multi-Spool High Pressure Core Engines, Turbofan Engines, and Power Generation Gas Turbine Engines", presented to the scientists of NASA Lewis Research Center, Advanced Control Technology Branch, Chief Carl Lorenzo, 1990.

Schobeiri, M. T. "Advanced Computer Codes for Design, Integration and Simulation of High Performance Jet Engines," presented to the Aero-Thermodynamic Design Group of General Electric Company, Cincinnati, September 8, 1989.

Schobeiri, M. T. "A New Method for Calculation of Loss Correlations for Transonic Compressors," presented to the Fluid Dynamics and Heat Transfer Division of NASA Lewis Research Center, Cleveland Ohio, December 4, 1989.

Schobeiri, M. T. "Development of an Advanced Computer Code for Simulation of Dynamic Behavior of High Pressure Core Engines," presented to the NASA LRC, Advanced Control Technology Branch, December 4, 1989.

Schobeiri, M. T. "Boundary Layer Transition under Turbo machinery Operation Conditions," presented to Fluid Dynamics and Heat Transfer Division of NASA LRC, Cleveland Ohio, December 5, 1989.

Schobeiri, M. T. "Optimum Design of Cooled Axial, Radial, and Mixed Flow Turbine Stages for High Efficiency and High Performance Gas Turbines and Rocket Engines," presented to the Turbine Design Branch of NASA LRC, Cleveland Ohio, December 5, 1989.

Schobeiri, M. T., "A New Method for Calculation of Loss Correlations for Transonic Compressors," presented to the Fluid Dynamics and Heat Transfer Division of NASA LRC, Cleveland Ohio, December 4, 1989.

Schobeiri, M. T., "Design and Integration of Power Generation Unit into the OC-OTEC Net Power Producing Experimental Facility," presented to SERI, Thermal Energy Division, Golden Colorado, August, 1989.

Schobeiri, M. T., "Optimum Design of a Low Pressure Radial Turbine," presented to the Solar Energy Research Institute and Department of Energy, Washington, May 11, 1988.

Schobeiri, M. T., "Digital Simulation of Jet Engines," presented to the USAF- AEDC (Arnold Engineering Development Center) in Tulahoma, Tennessee, November 22, 1988.

Schobeiri, M. T., "Development of a New Loss Model for Transonic Compressors," Invited by Dr. Arthur Wennerstrom, Wright Patterson AFB, Aero-Propulsion Lab, Dayton OH., Compressor Development Group, August

10, 1988.

7. RESEARCH GRANTS

7.1 Very Recent Grants

M.T. Schobeiri, A Breakthrough Technology: Title: The Ultra-High Efficiency Core Gas Turbine with Stator Internal Combustion, Sponsor: Adams Enterprises, this new project supports two Ph.D. Students, Amount $150,000
Date of Starts January 2013

M.T. Schobeiri, PI, Project Director and Je-Chin Han, Co-PI , " Aerodynamics and Heat Transfer Studies of a New Three-Stage High Pressure Turbine Rotor Specifically Designed top Meet IGCC-Requirements: High Mass flow Endwall Contouring, Leading Edge Filleting and Blade Tip Ejection under Rotating Turbine Conditions," Sponsor: DOE, grant total volume $500k, a three year project, Project Start: October 01, 2009.

M.T. Schobeiri, PI, "Development, Design and Efficiency and Performance Evaluation of High Efficiency HP-Turbine Blading," Sponsor: Doosan Heavy Industries, Korea, $535k for design tasks a Three-year Project started June 01, 2007.

M.T. Schobeiri, "Experimental Study of the Effects of Wakes on Separation in Low Pressure Turbine Flow," NASA GRC, $216,000, Period of performance January 01, 2003 to December 31, 2006 .

M.T. Schobeiri, "Experimental Study of the Effects of Wakes on Separation in Low Pressure Turbine Flow," NASA GRC, $163,470, Period of performance My 2001 to December 31, 2006 ..

M.T. Schobeiri, PI: Aerodynamics, J.C. Han, PI: Heat Transfer: Aerodynamic and heat transfer investigations in a high pressure turbine with a film cooled blades using PSP- techniques, Agency: Solar Turbine, $ 200,000.00,

M.T. Schobeiri, PI: Aerodynamics, J.C. Han, PI: Heat Transfer: Aerodynamic and heat transfer investigations in a high pressure turbine with a film cooled blades using PSP- techniques, Agency: Solar Turbine, $ 100,000.00, continuation, Nov. 2003.

M.T. Schobeiri, PI: Aerodynamics, J.C. Han, PI: Heat from rotating blade platforms with and without film cooling, Agency: DOE, $ 361,000.00, Grant posted

M.T. Schobeiri, PI: Aerodynamics, J.C. PI: Heat Transfer: Aerodynamic and heat transfer investigations in a high pressure turbine with a film cooled blades using PSP- techniques, Agency: NASA G.R.C, $ 216,000.00, Status: Grant already transferred to TEES

7.2 Previous Grants

M.T. Schobeiri, "Performance Tests and Flow Research Studies on Two Three-Stage Turbine Units, Part I: High Performance Reaction Turbine with Fully Three-D Blades, Part II: Zero-Degree of Reaction Turbine" November, 1997, $300,000, equipment $445.000, total 745.000).

M. T. Schobeiri, "Development of an Advanced Computer Code for Simulation of the Dynamic Behavior of High Pressure Core Engines," NASA Lewis Research Center, NAG3-1144, February 1990-1995, $248,080.

M. T. Schobeiri, "Boundary Layer Transition Under Turbomachinery Flow Conditions," NASA Lewis Research Center, NAG3-1256, March 1, 1991-March 1991-1994, $113,100.

M. T. Schobeiri, "Further Development Work of an Advanced Computer Code for Simulation of the Dynamic Behavior of High Pressure Core Engines, NASA Lewis Research Center, February 1995-1996, $35,000.

M. T. Schobeiri, "Influence of Unsteady Inlet Flow Condition and Film Cooling Injection on Curved Boundary Layer Flow and Heat Transfer," General Electric, Cincinnati, 1993, 18 Months, $54,000.

M. T. Schobeiri, with J.C. Han (both PIs), "Advanced Turbine Cooling, Heat Transfer and Aerodynamic Studies," DOE-AGTSR, September 1993-1996, $596,459.

M. T. Schobeiri, "Equipment Grant: Heat Transfer Curved Plate With Liquid Crystal Instrumentation for Unsteady Heat Transfer Investigations," NASA Lewis Research Center, NAG3-1256, 1994, $10,000.

M. T. Schobeiri, "Equipment Grant: Turbine Cascade for Integration into the Unsteady Turbine Cascade Research Facility," NASA Lewis Research Center, NAG3-1256, 1993, $20,000.

M. T. Schobeiri, "Equipment Grants for One Set of Seven Turbine Blades With Static Pressure Tabs and Trailing Edge Ejection Slots," General Electric, NY, 1995, $25,000.

J.C. Han and M. T. Schobeiri, "Heat Transfer in Turbines," State Texas, July 1990-1993, $180,000.

M. T. Schobeiri, "Optimum Aero-thermodynamic Design of Turbine Blades, Turbomachinery Research Consortium, May 15, 1989-May 15 1990, $15,000.

M. T. Schobeiri, "Establishment of an Unsteady Research Facility for the Simulation of Unsteady Flow Through Turbomachinery," Turbomachinery Research Consortium, May 15, 1990-May 15, 1991, $15,000.

M. T. Schobeiri, "Radial Turbine Design for OC-OTEC Power Generation," Solar Energy Research Institute, Golden Colorado, June 1989-August 1989, $10,000.

8. U.S. NATIONAL LABORATORIES SUMMER FACULTY RESEARCH GRANTS

M. T. Schobeiri, "Simulation of a General Electric Two-Spool Core with GETRAN, (GEneric Modular Structured Computer Code for the Simulation of Transient Behavior of Single- and Multi-Spool High Pressure Core Engines, Turbofan Engines, and Power Generation Gas Turbine Engines)," developed by T. Schobeiri for NASA Lewis Research Center, NASA Lewis Research Center, June 1993-August 1993, $10,000.

M. T. Schobeiri, "Critical Performance and Simulation Tests of GETRAN, a GEneric Modular Structured Computer Code for the Simulation of Transient Behavior of Single- and Multi-Spool High Pressure Core Engines, Turbofan Engines, and Power Generation Gas Turbine Engines," NASA Lewis Research Center, Systems Dynamics, June 1992-August 1992, $10,000,

M. T. Schobeiri, "Numerical Investigations of the Design and Off-design Behavior of the New Transonic Turbine Cascade Test Facility," NASA Lewis Research Center, June 1991-August 1991, $10,000.

M. T. Schobeiri, "Heat Transfer Investigations on Space Shuttle Main Engine," SSME, Blades, NASA Lewis Research Center, Fluid Physics Branch, Chief Dr. R. Gaugler, June 1990-August 1990, $10,000.

M. T. Schobeiri, "Radial Turbine Design for OC-OTEC Power Generation," Solar Energy Research Institute, Golden Colorado, June 1989-August 1989, $10,000.

9. SERVICES, SOCIETIES

9.1 University and Departmental Service

COE: Member of Graduate Faculty University: Graduate Council Representative, Committee. Chair and Co-chair.
COE: Member of Award Committee.
ME-Department: Member of Graduate Committee: Responsible for streamlining the fluid mechanics graduate core courses and development of a new graduate course, MEEN-622.
Appointed Member of Tenure and Promotion Committee
Appointed Member of Honor and Award Committee
Chairman and member of Fluid Mechanics Qualifying Exams Committee

9.2. Editorial Board, Editorship, etc.

A: Member of the International Scientific Committee of the International Symposium of Rotating Machinery
B: Editorial board: **Handbook of Mechanical Engineering**, Springer Verlag, Berlin, Heidelberg, New York
C: Associate Editor: British Journal of Energy and Power
D: Editor: International Journal of Rotating Machinery

9.3 Societies, Technical Committees

AIAA: American Institute of Aeronautics and Astronautics
ASME: American Society of Mechanical Engineers, Member of ASME Turbomachinery Technical Committee, Heat Transfer Committee
VDI : German Society of Mechanical Engineers.

9.3 Professional Service

Session Chair of ASME-International Gas Turbine Congress and Turbo-Expo, 2013, June 3-7, 2013, San Antonio, Texas, USA.

Vanguard Chair of ASME-IGTI Joint Sessions for Unsteady Aerodynamics and Heat Transfer, IGTI-

Conference, Copenhagen, Denmark, 2012 .

Vanguard Chair of ASME-IGTI Joint Sessions for Unsteady Aerodynamics and Heat Transfer, IGTI-Conference, Orlando, Florida, 2011, Vancouver Canada.

Vanguard Chair of ASME-IGTI Joint Sessions for Unsteady Aerodynamics and Heat Transfer, IGTI-Conference, Orlando, Florida, 2010.

Vanguard Chair of ASME-IGTI Joint Sessions for Unsteady Aerodynamics and Heat Transfer, IGTI-Conference, Orlando, Florida, 2009.

Vanguard Chair of ASME-IGTI Joint Sessions for Unsteady Aerodynamics and Heat Transfer, IGTI-Conference, Berlin, Germany , 2008.

Vanguard Chair of ASME-IGTI Joint Sessions for Unsteady Aerodynamics and Heat Transfer, IGTI-Conference, Nevada, 2005.

Appointed Conference Co-Organizer, Session Chairman and the reviewer of the 7^{th}, 8^{th}, 9^{th}, 10^{th}, 11^{th}, 13^{th} and 14^{th} International Symposium on Transport Phenomena and Dynamics of Rotating Machinery (ISROMAC-7-12) in Hawaii,

Appointed Session Chairman and the reviewer of the 8th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery (ISROMAC-6) in Hawaii, February March 28-31, 2000.

Appointed Session Chairman of the 5th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery (ISROMAC-6) in Hawaii, February 25-28, 1996.

Appointed Chairman and reviewer of the session "Boundary Layer Transition" of IGTI and the corresponding International Gas Turbine and Aero-Engine Congress and Exposition in Hague, Netherlands, June 13-16, 1994. Reviewer of and ASME Transactions, *Journal of Turbomachinery and Journal of Gas Turbine and Power*.

Appointed Co-Chairman and reviewer of the session, "Axial Flow Turbine Aerodynamics," of IGTI and the corresponding International Gas Turbine and Aero-Engine Congress and Exposition, Houston, Texas, June 5-8, 1995.

Appointed Session Chairman of the 5th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery (ISROMAC-5) in Maui, Hawaii, May 8-11, 1994 Journal.

Reviewer and Session Chairman of the Third International Symposium on Dynamics and Design of Rotating Machinery, Hawaii, 1990.

Reviewer and Session Chairman of the Second International Symposium on Dynamics and Design of Rotating Machinery, Hawaii, 1988.

Session chairman and reviewer of the ASME-WAM in Dallas, TX, 1990.

Reviewer of International Gas Turbine Conference and ASME Transactions, *Journal of Turbomachinery and Journal of Gas Turbine and Power*.

Reviewer of ASME Transactions *Journal of Fluid Engineering*.

Reviewer of *Journal of Experiments in Fluids*.

Reviewer of several other national and international journals.

9.4 Consulting and Advisory Boards

1) Scientific Advisory Board of International Symposium on Rotating Machinery, ISROMAC, since 1987,

2) R&D consultant of ABB, Asea Brown Boveri Gas Turbine Division, Baden Switzerland.

3) R&D Consultant of Dale Adams Enterprises, OH; consulting area: Innovation in Energy Production; project: Aero-Thermo Mechanical Design of a prototype of an Ultra High Efficiency Gas Turbine Engine with Stator-Internal Combustion by Dr. Schobeiri. This consulting resulted in a research grant in the amount of **$150 K** to the PIStudents Assigned: 2 Ph.D. Students

4)R&D Consultant of Ergenics Corporation, NJ, Research Area: Energy production for space vehicles
Research Project: Design of a 5kW prototype Deuterium turbine for space application.
Consulting outcome: I anticipate a grant to support one MS student

10. INTERNATIONAL OUTREACH

Official Coordinator of Student Exchange Program between Germany and Texas A&M

11. HONORS AND AWARDS

Alexander von Humboldt Fellowship Award, 2013

Recipient of Oscar Wyatt Professorship, 2010
Senior TEES Research Fellow, 2009
Alexander von Humboldt Research Prize, 2001
ASME, Moody Award, 2004 for ASME, Fluid Engineering Division Best Paper of the Year 2004
Alexander von Humboldt Fellowship Award, 2006
Recognition award for pioneering contribution to turbomachinery aero-thermal design, ISROMAC-2008
Visiting Professor, 2001-2002, Technical Universities Darmstadt, Dresden, University of Armed Forces Munich
Visiting Professor at Technical University Darmstadt, Germany, 2006 for the visiting period from June 1, 2006-August 31, 2006.
ASME Fellow, 2005
TEES Research Fellow Award 2004
Faculty Fellow, 2001
TEES Fellow , 1998
Three consecutive NASA Lewis Research Center Fellowships
Recognition award from the National Aeronautics and Space Administration, Lewis Research Center and the Ohio Aerospace Institute for Innovative Engine Simulation Technology, 1993.

Continental Industrie has 40 years of experience in research, development and manufacturing of centrifugal blowers and exhaust products. The companyâ€™s engineers uti-lized the ANSYS integrated design system for turbomachinery applications to design a next-generation centrifugal compres-sor for wastewater aeration applications that provides a 2 to 5 percent improvement in efficiency compared to the previ-ous-generation compressor.Â Experienced turbomachinery designers reviewed the test results and made educated guesses on which design changes might be able to deliver significant perfor-mance improvements. These design-ers were able to achieve significant improvements but were not able to fully optimize the design. The Short Courses are offered by experienced turbomachinery and pump users. Some topics covered by recent short course offerings include: â€¢ Basic Pump Hydraulics with a Minimum of Mathematics.Â A majority of the M.S. thesis research projects involve experimental validation of theoretical and computational developments. The emphasis on experimental validations of predictions stands in contrast to many graduate programs around the country. Ph.D. students generally concentrate on research topics related to ongoing research programs within the Laboratory. Basic and applied research. Faculty and staff of the Turbomachinery Laboratory carry out research activities for both industry and government. These conditions result in turbomachinery designs that are very compact and can operate with high design efficiencies with reasonable machine sizing and staging. The conditions also introduce multiple design challenges, including high bearing surface speeds and loads, dense gas effects on rotordynamics and blade loading, low-leakage shaft end sealing, high-temperature pressure containment and compact thermal management in the turbine, and wide operating range requirements and potential for condensation in the compressors.Â In the past 10 years, a number of sCO2 turbomachinery designs and prototypes have been developed.

Turbomachinery design is experiencing higher and higher benefits from the adoption of CFD techniques, in particular in the first stages of the design process. Massive tests of new design concepts over varying operating conditions require very fast computer codes for CFD to be competitive with experiments and to give results in a reasonable (from the industry point of view) time.Â Moastafa Mahmoodi, in Developments in Turbomachinery Flow, 2015. 6.1 Role of nonintrusive measurements on examination of complicated turbulent flows. Turbomachinery flows are characterized by asymmetric jetâ€“wake interactions and anisotropic flow structures, and these result in a complicated and three-dimensional flow, particularly at near-wall regions. Explore the latest publications in Turbomachinery, and find Turbomachinery experts. Questions (102). Publications (90,402).Â Abstract Despite over fifty years of research on shock wave boundary layer effects and interactions, many related technical issues continue to be controversial and debated. The present survey provides an overview of the present state of knowledge on such effects and interactions, including discussions of: (i) general features of shock wave interact Manna, M. Excellence in Turbomachinery Research: The Best of the 12th European Turbomachinery Conference. Int. J. Turbomach. Propuls. Power 2018, 3, 19. AMA Style. Manna M. Excellence in Turbomachinery Research: The Best of the 12th European Turbomachinery Conference.Â We use cookies on our website to ensure you get the best experience. Read more about our cookies here. Accept. We have just recently launched a new version of our website. Help us to further improve by taking part in this short 5 minute survey here. here. Never show this again. Share Link. Turbomachinery Research Centre. We investigate the theoretical, computational and experimental modelling of heat transfer and fluid flow related to turbomachinery. Recent news. Read about our ongoing activities. Mechanical Engineering PhD student presents at European Turbomachinery Conference (ETC).Â Our academics and researchers are finding innovative approaches to gas turbine research. Their activities are generating benefits for industry, the environment and society. Turbomachinery Research Centre academic staff. We have research expertise in theoretical, experimental and computational modelling of heat transfer and fluid flow in turbomachinery. Turbomachinery Research Centre researchers. Direct and large eddy simulations of realistic turbomachinery flows are now possible to analyze...Â Michelassi, V.: Modeling and resolving turbulence (and unsteadiness) in turbomachinery flows. Tutorial at ASME Turbo Expo. Montreal, Canada (2015)Google Scholar. 13. Pichler, R., Sandberg, R.D., Michelassi, V., Bhaskaran, R.: Investigation of the accuracy of RANS models to predict the flow through a low-pressure turbine. ASME J. Turbomach. 138 (2016)Google Scholar. 14.