CONTENTS

FUELS AND COMBUSTION, MATERIAL HANDLING, AND EMISSIONS

POWER2010-27014 .......................... 1
Features and Benefits of Gamma Level and Density Measurement in the Power Industry
Keith Riley

POWER2010-27049 .......................... 9
Analysis of Combustion Flame in Syngas-Air Mixtures
Eliseu Monteiro and Abel Rouboa

POWER2010-27081 .......................... 15
Conveyor Technologies for the Regulatory Environment
Greg Bierie and Andrew Marl

POWER2010-27083 .......................... 21
A Liquid Torrefaction Process for Producing a Storable, Energy-Dense Fuel From Biomass Feedstock

POWER2010-27092 .......................... 29
Biomass Attributes, Handling, and Processing Issues for Large Power Plants
Daniel Mahr

POWER2010-27139 .......................... 37
The Effect of Nitrogen in Natural Gas on the NOx Emission From a 90 kW Burner
Antonio Diego-Marin, Carlos Melendez-Cervantes, and Alejandro Mani-González

POWER2010-27237 .......................... 43
Flashback Propensity in Swirl Stabilized Burner With Syngas Fuels
Bidhan Dam, Gilberto Corona, and Ahsan Choudhuri

POWER2010-27264 .......................... 49
Improvements in Fuel Flexibility and Operating Cost Reduction at CSU Drake Station With Targeted In-Furnace Injection™ Technology
James Towell, Tom Martinez, David Hightower, Richard Maxey, Gerry Snow, Hector Gonzalez, and Robert Rians

POWER2010-27287 .......................... 57
Investigation of Distributed Combustion for Gas Turbine Application:
Forward Flow Configuration
Vaibhav K. Arghode and Ashwani K. Gupta

POWER2010-27294 .......................... 71
Laminar Flame Velocity of Syngas Fuels
Bidhan Dam, Vishwanath Ardha, and Ahsan Choudhuri
Colorless Distributed Combustion (CDC) With Swirl for Gas Turbine Application
Ahmed E. Khalil, Vaibhav K. Arghode, and Ashwani K. Gupta

Boiler Cleaning Using ISB (Intelligent Soot Blowing) System Integration:
Recent Developments and Case Study
Charlie Breeding, Danny Tandra, and Sandeep Shah

Modeling Dispersion of PM$_{10}$ and PST in the Cesar Department Mining Region, Colombia by Using ISC and AERMOD
Jose I. Huertas, Sebastián Izquierdo, and Enrique D. González

A Case Study on Generation of Acceptance Criteria in Feedwater Supply Tube Bends
Daniel T. Peters and Eric Jones

Interactive Computer Aided Preliminary Design of Shell and Tube Heat Exchangers
Hossin Omar

Developing Optimum Condenser Tube Life-Cycle Economics
Daniel S. Janikowski

The Considerations for Reviewing the Effects of Power Uprates, Including Repowering, on Existing Steam Surface Condensers
Darren M. Nightingale

Performance Prediction of a Single-Zone Vertical Feedwater Heater
Eric Svensson and William Mirowski

Pressure Testing Feedwater Heaters and Power Plant Auxiliary Heat Exchangers
Stanley Yokel

Impact of Generator Rating Increase, Ambient Pressure and Coolant Composition and Temperature on Power Generator Heat Exchangers
Luis P. Zea

Experimental Investigation of Seawater Fouling Effect on the 90/10 Cu/Ni Tube
M. Izadi, D. K. Aidun, P. Marzocca, and H. Lee
Increasing Condenser Capacity Without Adding Tubes to Support a Station Uprate
Warren C. Welch III, Timothy J. Harpster, and Joseph W. Harpster

Limitations of 439 SS in HP Feedwater Heater Application
Silvia Khurrum and Michael Catapano

Effective Expansion and Repair of Tube-to-Tubesheet Joints in a High Pressure Feedwater Heater
Darcy Holderness and Joe Bruno

TURBINES, GENERATORS, AND AUXILIARIES

Retrofit of Tehran City Gate Station (C.G.S.No.2) by Using Turboexpander
Ramin Taheri Seresht, Hassan Khodaei Jalalabadi, and Babak Rashidian

Generator Fan Test Facility to Quantify Axial Flow Fan Aerodynamic Performance
Andrew I. C. Hunter, H. A. Scarton, K. R. Wilt, S. A. Salamah, and D. Story

Successful Replacement of a Condemned HP/IP Turbine by Weld Process
Damian Parham and Calvin Davis

Blisk Life Prediction for Twin- Shaft Turbo Engines by Using a Two-Dimensional Thermal Off-Design Model
Ying Chen, Ashok Koul, and Jun Zhao

Turbine Steam Chest Life Assessment
Daniel T. Peters, Eric Jones, Sean Hastings, and Steven Greco

Determining HP-IP Turbine Seal Leakage
Fred D. Lang and Tom Canning

SGT-400 Industrial Gas Turbine Power Enhancement to 15MW Design and Product Validation
S. A. Ward and M. Johnson-Hirt

Determining Steam Turbine Inspection Intervals
Douglas D. Reed

A Modified Double Reheat Cycle
Sven Kjaer and Frank Drinhaus
Joseph R. Ciras and Michael G. Green

Setting Up Pipe Hanger Survey Programs at New Power Plants
Lange Kimball and Vernon Mize

Wind Integration: System and Generation Issues
Eugene R. Danneman and Stephen J. Beuning

Change Your Maintenance Philosophy When You Convert a Base Loaded Unit to Cycling Operation
S. Rao Palakodeti and Gregory Doelger

Applying Acoustic Pulse Reflectometry in a Geothermal Energy Plant: A Case Study
Noam Amir, Daniel Bobrow, and Tal Pechter

Design of Nuclear Safety-Related Underground Diesel Fuel Oil Storage Tanks
Shen Wang, Necip O. Akinci, William H. Johnson, and Luis M. Moreschi

Stress and Vibration Analysis for Woven Composite Axial Impeller
Jifeng Wang, Jorge Olortegui-Yume, and Norbert Müller

A Review of Experiences With AL-6XN® and Zeron® 100 Alloys in Air Pollution Control Systems
Devin M. Wachowiak and Jason D. Wilson

Review of Babbitt (Whitemetal) Analysis Using XRF-Analyzer
Lyle A. Branagan and Greg Herran

Implementation of Fourier Series in the Seismic Response Spectrum Analysis of Ground Supported Tanks
Bikramjit Singh Antaal, Yogeshwar Hari, and Dennis K. Williams

Investigation on the Performance of the 15kW OTEC System
Jianying Gong and Tieyu Gao
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extrapolation of Creep Curve and Creep Life Prediction From Secondary Creep by Evaluation of Strain Rate Change</td>
<td>483</td>
</tr>
<tr>
<td>Hiroyuki Sato</td>
<td></td>
</tr>
<tr>
<td>SIMPLE AND COMBINED CYCLE PLANTS</td>
<td></td>
</tr>
<tr>
<td>Hybrid Systems for Cooling Turbine Inlet Air for Preventing Capacity Loss and Energy Efficiency Reduction of Combustion Turbine Systems</td>
<td>485</td>
</tr>
<tr>
<td>Dharam V. Punwani</td>
<td></td>
</tr>
<tr>
<td>Combustion Turbine Fuel Flexibility From Plant Designer’s Perspective</td>
<td>489</td>
</tr>
<tr>
<td>Walter I. Serbetci</td>
<td></td>
</tr>
<tr>
<td>Technical and Economic Analysis of Cogeneration Systems for Refinery Power Plant Applications</td>
<td>499</td>
</tr>
<tr>
<td>J. Hugo Rodríguez Martínez, Agustín Alcaraz Calderón, Luis Iván Ruiz Flores, and Roberto Valdez Vargas</td>
<td></td>
</tr>
<tr>
<td>Integrated Exhaust System for Simple Cycle Power Plants</td>
<td>509</td>
</tr>
<tr>
<td>Mark A. Buzanowski and Sean P. McMenamin</td>
<td></td>
</tr>
<tr>
<td>Xcel Energy Riverside Repowering Project</td>
<td>515</td>
</tr>
<tr>
<td>Paul Eiden, Timothy Rathsam, and Darin Schottler</td>
<td></td>
</tr>
<tr>
<td>ADVANCED ENERGY SYSTEMS</td>
<td></td>
</tr>
<tr>
<td>Oxyfuel PFBC-CC Power Generation Process</td>
<td>527</td>
</tr>
<tr>
<td>Shimin Deng and Rory Hynes</td>
<td></td>
</tr>
<tr>
<td>Simultaneous Energy and Water Minimization: Approach for Systems With Optimum Regeneration of Wastewater</td>
<td>539</td>
</tr>
<tr>
<td>Samira Karbassian and Mohammad Hassan Panjeshahi</td>
<td></td>
</tr>
<tr>
<td>Design of an Experimental System for Cryogenic Compact Exchanger</td>
<td>553</td>
</tr>
<tr>
<td>Jiancheng Tang and Yingbai Xie</td>
<td></td>
</tr>
<tr>
<td>Preliminary Research of a Zero CO₂ Emission Power Generation System</td>
<td>557</td>
</tr>
<tr>
<td>Jing-yu Ran and Chang lei Qin</td>
<td></td>
</tr>
<tr>
<td>Nuclear Power and Coal: An Unexpected Marriage</td>
<td>567</td>
</tr>
<tr>
<td>Michael F. Keller</td>
<td></td>
</tr>
</tbody>
</table>
NETL Virtual Reality Dynamic Simulation Research and Training Center Promotes IGCC Technology With CO₂ Capture
Graham T. Provost, Stephen E. Zitney, Richard A. Turton, Michael R. Erbes, and Herman P. Stone

Hot Windbox and Combined Cycle Repowering to Improve Heat Rate
Tarek A. Tawfik and Thomas P. Smith

A Micro Combined Heat and Power Thermodynamic Analysis and Optimization
Ali Gholizadeh, M. B. Shafii, and M. H. Saidi

RENEWABLES (WIND, SOLAR, GEOTHERMAL)
Quasi-Exact-Constraint Design of Wind Turbine Gearing
Hani A. Arafa and Mostafa Bedewy

Power Performance Tests on a Different Wind Turbine Rotor Blade Design
Ryo Amano, Ilya Avdeev, Ryan Malloy, and Mir Zunaid Shams

Experimental and Theoretical Study on the Aerodynamic Performance of a Small Horizontal Axis Wind Turbine
Maryam Refan and Horia Hangan

Design of a Cross Flow Turbine for a Micro-Hydro Power Application
Javed A. Chattha, Mohammad S. Khan, Syed T. Wasif, Osama A. Ghani, Mohammad O. Zia, and Zohaib Hamid

A Scalable, Economical, Uninterrupted Solar Thermal Power System
Brent R. Bartlett, Bruce McGeoch, Edward Whitaker, and David A. Torrey

Torque and Power Coefficients of a Vertical Axis Wind Turbine With Optimal Pitch Control

Nuclear and Solar Energy: An Unexpected Alliance
Michael F. Keller

Heat Recovery From Tail Gas Incineration to Generate Power
Tarek A. Tawfik and Thomas P. Smith
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malaysian Biomass Resources: Green Renewable Contribution in the National Energy Mix</td>
<td>685</td>
</tr>
<tr>
<td>Abd Halim Shamsuddin</td>
<td></td>
</tr>
<tr>
<td>Process Control and Design Issues in a Concentrated Solar Power Trough Plant With Thermal Storage</td>
<td>691</td>
</tr>
<tr>
<td>Brad Bullington</td>
<td></td>
</tr>
<tr>
<td>Gasification: Eliminating Risks Associated With Co-Firing Biomass</td>
<td>699</td>
</tr>
<tr>
<td>Thomas J. Paskach and John P. Reardon</td>
<td></td>
</tr>
<tr>
<td>THERMAL HYDRAULICS AND CFD</td>
<td>703</td>
</tr>
<tr>
<td>Influence of the Constraint Equations in the Thermo-Mechanics Stress Analysis in Blades of Gas Turbine</td>
<td></td>
</tr>
<tr>
<td>Vicente Pérez-García, Alfonso Campos-Amezcua, Armando Gallegos-Muñoz, Z. Mazur, Rafael A. Rodríguez-Cruz, and Juan M. Belman-Flores</td>
<td></td>
</tr>
<tr>
<td>Computations for Unsteady Compressible Flows in a Multi-Stage Steam Turbine With Steam Properties at Low Load Operations</td>
<td>711</td>
</tr>
<tr>
<td>Shigeki Senoo, Takeshi Kudo, Kiyoshi Segawa, Tateki Nakamura, Hisashi Hamatake, and Naoaki Shibashita</td>
<td></td>
</tr>
<tr>
<td>Study of the Heat Transfer in an Annular Combustor</td>
<td>723</td>
</tr>
<tr>
<td>A. Ramírez-Barrón, Simón Martínez-Martínez, A. Gallegos-Muñoz, and J. M. Riesco-Ávila</td>
<td></td>
</tr>
<tr>
<td>Numerical-Experimental Study of the Gas LP Atmospheric Burner</td>
<td>733</td>
</tr>
<tr>
<td>A. Ramírez-Barrón, S. Martínez-Martínez, A. Aguilar-Moreno, F. A. Sánchez-Cruz, A. Gallegos-Muñoz, and J. M. Riesco-Ávila</td>
<td></td>
</tr>
<tr>
<td>Use of CFD Modeling for Designing Intake and Discharge Structures in a Discharge Canal</td>
<td>743</td>
</tr>
<tr>
<td>Fangbiao Lin, George Pigg, and Gerald Schohl</td>
<td></td>
</tr>
<tr>
<td>Rotating Drum Raw Water Strainer Fluid Mechanics and Debris Cleanout</td>
<td>749</td>
</tr>
<tr>
<td>Ludwig C. Haber and James Smith</td>
<td></td>
</tr>
<tr>
<td>CFD Analysis of Composite Axial Water Turbine</td>
<td>757</td>
</tr>
<tr>
<td>Jifeng Wang and Norbert Müller</td>
<td></td>
</tr>
<tr>
<td>Numerical Study of the Flow and Temperature Distributions in a 350 MW Utility Boiler</td>
<td>767</td>
</tr>
<tr>
<td>Iván F. Galindo-García, Ana Karenina Vázquez Barragán, and Miguel Rossano Román</td>
<td></td>
</tr>
</tbody>
</table>