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10th International Conference on Circulating Fluidized Beds and Fluidization Technology - CFB-10

Refereed Proceedings

2011

Conference Program

Ted Knowlton
PSRI, USA

Program

International Conference on Circulating Fluidized Beds and Fluidization Technology - CFB-10

May 1 - 5, 2011

Sunriver Resort
Sunriver, Oregon, USA

Conference Chair

Ted M. Knowlton
Particulate Solid Research, Inc, USA

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NOTES

- Sunday conference check-in will be in Homestead Lobby

- Sunday Social Program meeting with Sunriver concierge and Wanderlust Tours presentation will be in Homestead 2.

- Sunday reception will be in the Great Hall Foyer

- Technical Sessions will be held in the Homestead Building.
  - Plenary Sessions in Homestead 1/2/3
  - Concurrent Sessions in Homestead 1 and 2/3
  - Workshop A – Homestead 1/2/3
  - Workshop B – Homestead 1
  - Workshop C – Homestead 2/3
  - Workshop D – Great Hall

- Poster Sessions will be held in Heritage Room.
  - Sunday "Free Forum/Late Breaking Information" posters should be hung prior to 9 pm on Sunday and removed after the poster session.
  - Monday-Thursday posters – Hang your poster on the same day as the day you make your oral presentation and remove the poster immediately at the end of the poster session as presenters for the next day may begin to hang their posters.

- Except for the banquet on Thursday, All meals will be held in Great Hall except for the Banquet on Thursday evening which will be held at the High Desert Museum.

- Banquet at the High Desert Museum. Please promptly meet at 7:20 pm at the Sunriver Lodge entry for bus departures to the High Desert Museum. Upon arrival at the Museum please take time to enjoy the exhibits with the "Living History" docents. The gift shop with its extensive display of items from Oregon will be open until 9:45 pm. There will be a light reception and 8:00 pm and the buffet will open at 8:30 pm; however, exhibits will continue to be open. If the buffet line is long, take this time to continue to enjoy the exhibits. At 9:30 buffet sponsor CPFD will make a presentation. Buses depart for Sunriver at 10:15 pm and will drop people off either at the Sunriver Lodge entry or near the Heritage rooms for the dessert/coffee/poster session/social hour.

- Tuesday International Advisory Board meeting will be in the Fireside Room (Great Hall complex)

- Audiotaping, videotaping and photography of presentations are prohibited.

- Speakers – Please leave at least 3-5 minutes for questions and discussion.

- Please do not smoke at any conference functions.

- Turn your cellular telephones to vibrate or off during technical sessions.

- Be sure to make any corrections to your name/contact information on the Master Participant List or confirm that the listing is correct. A corrected copy will be sent to all participants after the conference.

Sunday, May 1, 2011

One-Day Seminar on Fluidization

(separate registration)

08:00 – 08:30	Registration/Check-in – Homestead 2 Room
08:30 – 10:15	Hydrodynamics John Grace
10:15 – 10:30	Coffee Break
10:30 – 11:15	Scaling and Scale-Up Ted Knowlton
11:15 – 12:00	Cyclone Design and Operation Ted Knowlton
12:00 – 13:00	Lunch
13:00 – 13:45	Standpipes/Non-Mechanical Valves Ted Knowlton
13:45 – 14:30	Heat Transfer John Grace
14:30 – 14:45	Coffee Break
14:45 – 16:15	Reactors and Combustors Joachim Werther
16:15 – 16:45	Question-and-Answer period with Instructors
16:45	Adjourn

Sunday, May 1, 2011

14:00 – 18:00	Conference Check-in
17:30 – 18:30	Activity Program Meeting
18:30 – 19:30	Reception
19:30 – 21:30	Dinner
21:30 – 23:00	Special Poster Session/Social Hour

Monday, May 2, 2011

07:00 - 08:15	**Breakfast**	
08:15 – 08:30	**Conference Opening:** Conference Chair: Ted Knowlton and ECI Technical Liaison: Dale Keairns	
	PLENARY SESSION 1 Chair: R. Cocco	
08:30 - 09:30	**P-1: Reflections on Mathematical Models and Simulation of Gas-Particle Flows** Sankaran Sundaresan, Princeton University, USA	
09:30 - 09:40	**BREAK**	
	SESSION 1 **Solids Flow and Circulation** Co-Chairs: J. Zhu and U. Muschelknautz	**SESSION 2** **Novel Fluidized Bed Processes** Co-Chairs: P. Basu and Y. Cheng
09:40 - 09:54	**1-1: Gas Tracer Study in a Non-Mechanical L-Valve** M.M.Yazdanpanah, A. Hoteit, A. Forret Thierry Gauthier IFP Energies Nouvelles Arnaud Delabarre Université Henri Poincaré, France	**2-1 Process Decoupling of Plasma Enhanced Synthesis of Chlorinated Polyvinyl Chloride (CPVC) Particles in a Circulating Fluidized Bed** W. Lu, T. Cao, Y. Cheng Tsinghua University, China
09:54 - 10:08	**1-2: Investigation on the Hydrodynamic Properties in the External Loop of a Circulating Fluidized Bed with a Loop Seal** X. Yao, T. Wang, H. Yang, H. Zhang, Q. Liu, J. Lv Tsinghua University, China	**2-2 Manufacture of Granular Polysilicon from Trichlorosilane in an Internally Circulating Fluidized Bed Reactor** C. Wang, T. Wang, Z. Wang Tsinghua University, China
10:08 - 10:22	**1-3: Hydrodynamics of a Dual Fluidized Bed System Which has Internal Mixing Channels Between CFB and BFB Reactor** U. Lee, I. Choi, W. Yang, Y. Kim, Y. Choi Korea Institute of Industrial Technology J. Song - SeenTec Co., Ltd., Korea Korea	**2-3 High-Flux Triple Bed Circulating Fluidized Bed (TBCFB) Gasifier for Exergy Recuperative IGCC/IGFC** C. Fushimi, G. Guan, M. Ishizuka Y. Nakamura, A. Tsutsumi The University of Tokyo, Japan Y. Suzuki, National Institute of Industrial Science, Japan E.W.C. Lim, Y. Cheng, C-H. Wang National University of Singapore, Singapore

Monday, May 2, 2011 (continued)

10:22 - 10:36	**1-4: Particle Flow in L-Valves** D. Subbarao University Teknologi Petronas, Malaysia	**2-4: Bio-Gasoline from Jatropha Oil: New Applications for the FCC- Process** A. Weinert, A. Reichold, P. Bielansky C. Schonberger, B. Schumi Vienna University of Technology, Austria
10:36 - 11:00	**COFFEE BREAK**	
11:00 - 11:14	**1-5: A Generalized Flow Diagram for Fluid-Solid Vertical Transport** X. Bi University of British Columbia, Canada	**2-5 Waste Wood Gasification: Distribution of Nitrogen, Sulphur and Chlorine in a Dual Fluidised Bed Steam Gasifier** V. Wilk, C. Aichernig, H. Hofbauer Vienna University of Technology, Austria
11:14 - 11:28	**1-6: Cold Model Investigations of a High Temperature Looping Process in a Dual Circulating Fluidized Bed System** A.R. Bidwe, C. Hawthorne, A. Charitos, M.A.M. Dominguez, H. Dieter, A. Schuster, G. Scheffknecht University of Stuttgart, Germany	**2-6: Removal of Nitrate from Water Using Fluidized Bed Ion Exchange Column** Ammar Arab Beddai, V.V. Basava Rao Osmania University, India
11:28 - 11:42	**1-7: Hydrodynamics of a Loop Seal Operated in a Circulating Fluidized Bed: Influence of the Operating Parameters on Gas and Solid Flow Patterns** R. Solimene, R. Chirone Istituto di Recerche sulla Combustione - CNR P. Bareschino Universita degli Studi del Sannio P. Salatino Universita degli Studi di Napoli Federico II Italy	**2-7: A Pyrolysis Pilot Unit Integrated to a Circulating Fluidized Bed Boiler - Experiences from a Pilot Project** J. Autio, J. Lehto, Metso Power Oy P. Jokela, UPM J. Alin, Fortum A. Oasmaa, Y. Solantausta, VTT, Finland
11:42 - 11:56	**1-8: Effects of Particle Properties on Cluster Characteristics in a 2-D CFB Riser** J. Xu and J. Zhu University of Western Ontario, Canada	**2-8: Production of Gasoline and Gaseous Olefins by Catalytic Cracking of Pyrolysis Oil** P. Bielansky, A. Reichhold, A. Weinert Vienna University of Technology, Austria

Monday, May 2, 2011 (continued)

11:56 - 12:10	**1-9: Flow Field in a Novel Short Residence Time Gas-Solid Separator** M. Liu, C. Zhou, C. Lu, Z. Wang China University of Petroleum, China	**2-9: Energetic Optimization of the Lignin Pyrolysis for the Production of Aromatic Hydrocarbons** M. Franck, B. Lorenz, E-U. Hartge, S. Heinrich, J. Werther Hamburg University of Technology, Germany
12:10 - 12:24	**1-10: Cold Model Study on Interconnected Fluidized Bed Reactors for Multi-Generation Systems and Chemical Looping Processes** G.A. Ryabov, O.M. Folomeyev, D.A. Sankin, K.V.Khaneyev, All-Russian Thermal Engineering Institute, Russia	**2-10: Studies on Propane Dehydrogenation to Propylene in a Gas-Solid-Sold Fluidized Bed Reactor** Y. Chu, T. Wu, Y. Li, Z. Nawaz, T. Wang F. Wei Tsinghua University, China
12:30 – 14:00	**LUNCH**	
14:00 - 17:30	**FREE TIME / *ad hoc* SESSIONS / AFTERNOON COFFEE AT 17:00**	
	SESSION 3 **Mathematical Modeling I** Co-Chairs: N. Mostoufi and F. Johnson	**SESSION 4** **Chemical Looping** Co-Chairs:E-U. Hartge and R. Gupta
17:30 - 17:44	**3-1: A Modeling Study of Gas Streaming in a Deep Fluidized Bed of Geldart A Particles** S. Karimipour, T. Pugsley University of Saskatchewan, Canada	**4-1: The Development of a Novel Cu-Mn Oxygen Carrier for the Chemical Looping Gasification of Biomass** M. Aghabararnejad, J. Chaouki, G.S. Patience Ecole Polytechnique de Montreal, Canada
17:44 - 17:58	**3-2: Effects of Gas Velocity and Solid Hold-Up on the Sub-Grid Behavior of Riser Flows** C.C. Milioli, F. E. Milioli University of São Paulo, Brazil	**4-2:CO_2 Looping Cycle for CO_2 Separation** T. Shimizu, H. T. Takahashi, Narisawa, L. Li, H. Kim Niigata University, Japan
17:58 - 18:12	**3-3: Numerical Simulations of a Circulating Fluidized Bed with a Square Cross-Section** T. Li, C. Guenther National Energy Technology Laboratory; S. Pannala Oak Ridge Institute for Science and Education, USA	**4-3: Fluid Dynamic Effects of Ring-Type Internals in a Dual Circulating Fluidized Bed System** D.C. Guio Perez, K. Marx, T. Proell, H. Hofbauer Vienna University of Technology, Austria

Monday, May 2, 2011 (continued)

18:12 - 18:26	**3-4: High-Resolution Simulations of Gas-Solids Jet Penetration Into a High-Density Riser Flow** T. Li, C. Guenther National Energy Technology Laboratory, USA	**4-4: Design Requirements for Pressurized Chemical Looping Reforming** K. Marx, T. Proell, H. Hofbauer Vienna Institute of Technology, Austria
18:26 - 18:40	**3-5: Simulation of Particle-Gas Flow in a Cyclone Using URANS** A. Karvinen, H. Ahlstedt, Tampere University of Technology M. Palonen, Metso Power Oy, Finland	**4-5: The Influence of Carbon Stripper Efficiency on CO_2 Capture Rate in a Chemical-Looping Combustion Process for Solid Fuels** M. Kramp, A. Thon, E-U. Hartge, S. Heinrich J. Werther Hamburg University of Technology, Germany
18:40 - 18:54	**3-6: Evaluation of a Lagrangian Discrete Phase Modeling Approach for Application to Industrial Scale Bubbling Fluidized Beds** S. Cloete, S.T. Johansen, M. Braun, S. Amini, SINTEF Materials and Chemistry, Norway; M. Braun, B. Popoff Ansys, Germany	**4-6: Study of Calcination-Carbonation of Calcium Carbonate in Different Fluidizing Mediums for Chemical Looping Gasification in Circulating Fluidized Beds** B. Acharya, A. Dutta, P. Basu Dalhousie University, Canada
18:54 - 19:08	**3-7: Effect of Wall Boundary Conditions and Mesh Refinement on Numerical Simulation of Pressurized Dense Fluidized Bed for Polymerization Reactor** P. Fede, O. Simonin, R. Ansart, H. Neau Universite de Toulouse, France; I. Ghouila INEOS, France	**4-7: Understanding Standpipe Hydrodynamics Using Electrical Capacitance Tomography** C. Qui, R. Joachim Industrial Tomography Systems, USA S.B.R. Karri Particulate Solid Research, Inc., USA
19:08 - 19:22	**3-8 Fluidized Bed Membrane Reactor for Steam Reforming of Higher Hydrocarbons: Model Sensitivity** M.A. Rakib, J.R. Grace, C.J, Lim University of British Columbia, Canada	**11-7 : A Practical Model for a Dense-Bed Countercurrent FCC Regenerator** Y. Zhang, C. Lu China University of Petroleum, China
19:30 - 21:15	**DINNER**	
21:15 - 23:00	**POSTER SESSION, DESSERT and SOCIAL HOUR for Papers presented in Sessions 1, 2, 3 and 4**	

Tuesday, May 3, 2011

07:00 - 08:30	**Breakfast**	
	PLENARY SESSION 2 Chair: J. Werther	
08:30 - 09:30	**P-2: Electrostatic Phenomena in Fluidized Systems: Present Status of Understanding, and Research Needs** Xiaotao Bi, University of British Columbia	
09:30 - 09:40	**BREAK**	
	SESSION 5 **Dynamics of Gas-Solids Flow** Co-Chairs: J. Grace and B. Formisani	**SESSION 6** **Combustion and Gasification** Co-Chairs: W. Nowak and A. Luckos
09:40 - 09:54	**5-1: Design Criteria of Uniflow Cyclones for the Separation of Solid Particles from Gases** U. Muschelknautz, P. Pattis, M. Reinalter, M. Kraxner MCI Management Center Innsbruck, Austria	**6-1: Experimental Study on the Effects of Gas Permeation Through Flat Membranes on the Hydrodynamics in Fluidized Beds** J.F. de Jong, M. van Sint Annaland, J.A.M. Kuipers, Eindhoven University of Technology, The Netherlands
09:54 - 10:08	**5-2: Erosion in Second Stage Cyclones: Effects of Cyclone Length and Outlet Gas Velocity** S.B. Reddy Karri, R. Cocco and T.M. Knowlton Particulate Solid Research, Inc., USA	**6-2: Experimental Study on Reforming Activity and Oxygen Transfer of Fe-Olivine in a Dual Circulating Fluidized Bed System** S. Koppatz, T. Proell, C. Pfeifer, H. Hofbauer Vienna University of Technology, Austria
10:08 - 10:22	**5-3: Correlation of the Minimum Spouting Velocity for the Design of Open-Sided Draft Tube Conical Spouted Beds for the Treatment of Fine Materials** M. Olazar, H. Altzibar, G. Lopez, I. Estiati, J. Bilbao, University of the Basque Country Spain	**6-3: Study of Recarbonation in Circulating Fluidized Bed Combustion** I. Hyytiainen, H. Lemmetyinen, Tampere University of Technology A. Mahlamaki, M. Palonen, M. Varonen, Metso Power Oy, Finland
10:22 - 10:36	**5-4: Hydrodynamics of Conical Spouted Beds with High Density Particles** S. Sari, D. Zaglanmis, M. Koksal, Hacettepe University A. Polat, G. Kulah Middle East Technical University, Turkey	**6-4: Effect of Temperature Field on the Coal Devolatilization in a Millisecond Downer Reactor** B. Yan, L. Zhang, Y. Jin, Y. Cheng Tsinghua University, China

Tuesday, May 3, 2011 (continued)

10:36 - 11:00	**COFFEE BREAK**	
11:00 - 11:14	**5-5: Experiments and Modelling of Micro-Jet Assisted Fluidization of Nanopowder** J.R. van Ommen, N. Loojie, Delft University of Technology, The Netherlands D.M. King, A. Weimer, S. Johnson, University of Colorado, USA R. Pfeffer, University of Arizona, USA B.G.M. van Wachem, Imperial College London, U.K.	**6-5: The Research of CFB Boiler Operation for Oxygen Enhanced Dried Lignite Combustion** W. Muskala, J. Krzywanski, T. Czakiert, W. Nowak, Czestochowa University of Technology, Poland
11:14 - 11:28	**5-6: Effect of Gas Bypassing in Deep Beds on Cyclone Dipleg Operation** A.S. Issangya, S.B. Reddy Karri, T.M. Knowlton, R. Cocco Particulate Solid Research, Inc., USA	**6-6: Oxy-Combustion of Different Coals in a Circulating Fluidized Bed** M. Kosowska-Golachowska, K. Klos, T. Musial, Czestochowa University of Technology, Poland A. Luckos, Sasol Technology, South Africa
11:28 - 11:42	**5-7: Fluidization Behavior in a Gas-Solid Fluidized Bed with Thermally Induced Inter-Particle Forces** J. Shabanian, F. Fotovat, J. Bouffard, J. Chaouki, Ecole Polytechnique de Montreal, Canada	**6-7: Effects of Secondary Air Injection Upon the Fluidization Characteristics of the Lower Stage in a Two-Stage, Variable-Area Fluidized Bed Riser** E.K. Johnson, S.L. Rowan, West Virginia University, USA
11:42 - 11:56	**5-8: Particle to Gas Heat Transfer in a Circulating Fluidized Bed Riser** Y.T. Makkawi, Aston University, U.K.	**6-8: Gas-Solids Hydrodynamics in a CFB with 6 Cyclones and a Pang Leg** L. Cheng, X. Zhoui, C. Wang, Z. Wang, Z. Luo, K. Cen, L, Nie, C. Wu, Q, Zhou Zhejiang University, China
11:56 - 12:10	**5-9: Fast Pyrolysis Process Intensification: Study of the Gas Phase Residence Time Distribution and Backmixing in a Downer Reactor** M. Huard, F. Berruti, C. Briens, The University of Western Ontario, Canada	

Tuesday, May 3, 2011 (continued)

12:30 - 14:00	**LUNCH**		
14:00 - 15:40	**WORKSHOP A** ***Panel Discussion on Energy*** Chair: D. Keairns		
15:45 - 17:20	**WORKSHOP B** ***Chemical Looping*** Chair: L. S. Fan	**WORKSHOP C** ***Instrumentation for Fluid Particle Systems*** Chair: J. R. van Ommen	**WORKSHOP D** ***PSRI/NETL Challenge Problem*** Co-Chairs: L. Shadle and R. Cocco
17:15 - 17:30	**COFFEE BREAK**		
	SESSION 7 **Mathematical Modeling II** Co-Chairs: J. Li and H. Arastoopour	**SESSION 8** **Industrial Operation of Fluidized Beds** Co-Chairs: P. Gauville and J. de Jong	
17:30 - 17:44	**7-1: DEM-CFD Modeling of a Bubbling Fluidized Bed and a Wurster Coater** L. Fries, S. Antonyuk, S. Heinrich, S. Palzer Hamburg University of Technology, Germany	**8-1: Commissioning of a 0.8 MWth CFBC for Oxy-Fuel Combustion** L. Jia, Y. Tan, D. McCalden, Y. Wu, I He R. Symonds, E.J. Anthony Canmet Energy, Canada	
17:44 - 17:58	**7-2: Elutriation from Fluidized Beds: Comparison Between Experimental Measurements and 3D Simulation Results** R. Ansart, H. Neau, O. Simonin, IMFT P. Accart, A. de Ryck, CNRS Universite de Toulouse, France	**8-2: High Sulfur Lignite Fired Large CFB Boilers-Design and Operating Experience** M. Lakshminarasimhan, B Ravikumar, A. Lawrence, M. Muthukrishnan, Bharat Heavy Electrical Limited, India	
17:58 - 18:12	**7-3: Fluidized Bed Gasification of Mixed Plastic Wastes: A Material and a Substance Flow Analysis** M.L. Mastellone, U. Arena Second University of Naples, Italy	**8-3: Research on Heat Transfer Inside the Furnace of Large Scale CFB Boilers** R. Zhang, H. Yang, H. Zhang, Q. Liu, J. Lu Y. Wu, Tsinghua University, China	
18:12 - 18:26	**7-4: Circulating Fluidized Bed Combustion-Build-Up and Validation of a Three-Dimensional Model** M. Palonen, V. Yla-Outinen, Metso Power Oy, J. Laine, Tampere University of Technology, Finland D. Pallares, A. Larsson, F. Johnsson Chalmers University of Technology, Sweden	**8-4: Design and Operation of Biomass Circulating Fluidized Bed Boiler with High Steam Parameter** S. Li, S. Bao, Q. Lu, D. Wang, H. Teng Chinese Academy of Sciences Y. Peng, Z. Liu, B. Hong Changsha Boiler Plant Co., Ltd., China	

Tuesday, May 3, 2011 (continued)

18:26 - 18:40	**7-5: 3D CFD Simulation of Combustion in a 150 MWe Circulating Fluidized Bed Boiler** N. Zhang, B. Lu, W. Wang, J. Li, Chinese Academy of Sciences, China	**8-5: Operating Experience and Latest Developments of Alstom Power's 300 MWe Class CFB Boilers** B. Wilhelm, P. Gauville, I. Abdulally, C. Enault Alstom Power, France
18:40 - 18:56	**7-6: Comparison Between Measurements and Numerical Simulation of Particle Flow and Combustion a the CFBC Plant Duisburg** M. Weng, Aixprocess, J. Plackmeyer, Consulting Engineer, Germany	**8-6: UOP FCC Innovations Developed Using Sophisticated Engineering Tools** L. Wolschlag, K. Couch, L. Davydov presenter UOP LLC, USA
18:56 - 19:10	**7-7: Hydrodynamics of a Cluster Descending at the Wall of a CFB Riser - Numerical Study** S. Vashisth, J. Grace University of British Columbia. Canada	**8-7: Co-Gasification of Biomass and Coal in an 8MW Dual Fluidized Bed Steam Gasifier** C. Pfeifer, I. Aigner, H. Hofbauer Vienna University of Technology, Austria
19:10 - 19:24	**7-8: Characteristics of the Solid Volume Fraction Fluctuations in a CFB** J. Peltola, S. Kallio, V. Taivassalo VTT Technical Research Centre of Finland Finland	**8-8: Coal and Biomass Co-Gasification in a Circulating Fluidized Bed Reactor** A. Czaplicki, M. Sciazko Institute for Chemical Processing of Coal Poland
19:30 - 21:15	**DINNER**	
21:00 – 22:00	**CFB INTERNATIONAL ADVISORY BOARD MEETING**	
21:15 - 23:00	**POSTER SESSION, DESSERT and SOCIAL HOUR for Papers presented in Sessions 5, 6, 7 and 8**	

Wednesday, May 4, 2011

07:00 - 08:30	**Breakfast**	
	PLENARY SESSION 3 Chair: L. S. Fan	
08:30 - 09:30	**P-3: Evolution of FCC Technology-Past, Present and Future and the Challenges of Operating a High-Temperature CFB System** Ye Mon Chen, Shell Global Services	
	PLENARY SESSION 4 Chair: L. S. Fan	
09:30 - 10:30	**P-4: Putting Structure into Fluidized Bed – From Concept to Industrial Applications** Fei Wei, Tsinghua University, China	
10:30 - 11:00	**COFFEE BREAK**	
	SESSION 9 **Particle Dynamics** Co-Chairs: C. Pfeifer and R. Karri	**SESSION 10** **HT/HP Research** Co-Chairs: K. Wirth and S. Moffatt
11:00 - 11:14	**9-1: Sulfur Uptake by Limestone-Based Sorbent Particles in CFBC: The Influence of Attrition/Fragmentation on Sorbent Inventory and Particle Size Distribution** F. Montagnaro, P. Salatino, F. Scala, M. Urciuolo Universita degli Studi di Napoli Federico II, Italy	**10-1: The Variation of the Bubble Phase Properties of a FCC Fluidized Bed at High Temperature** R. Girimonte, B. Formisani University of Calabria, Italy
11:14 - 11:28	**9-2: Study of Standpipe and Loop Seal Behavior in a Circulating Fluidized Bed for Geldart B Particles** A.R. Bidwe, A. Charitos, H. Dieter, A. Wei, M. Zieba, G. Scheffknect University of Stuttgart, Germany	**10-2: A Study of Solids and Gas Mixing in a Partitioned Fluidized Bed** J-H. Moon, Y-J. Seo, S. Kang, S-Y. Lee, Y-C. Park, H-J. Ryu, G-T. Jin Korea Institute of Energy Research, Korea
11:28 - 11:42	**9-3: Observation of Flow Regime Transition in a CFB Riser Using an LDV** L. Shadle , P. Yue, J. Mei National Energy Technology Laboratory, USA	**10-3: Coal Ignition Temperature in Oxygen-Enriched CFB Boiler** J. Chao, H. Yang, J. Lu, H. Zhang, Q. Liu Y. Wu Tsinghua University, China

Wednesday, May 4, 2011 (continued)

11:42 - 11:56	**9-4: Bench-Scale Investigation of Limestone Size Evolution in a Fluidized Bed Combustor** X. Yao, N. Hu, H. Yang Tsinghua University, China J.H. Chiu, P. Gauville, S.G. Kang Alstom Power Inc., USA	**10-4: Effect of Bed Temperature, Fuel Density and Particle Size on Hydrodynamic Parameters of 10 MW Fluidized Bed Combustion Power Plant Using Riser Waste** R..I. Singh Jassar Guru Nanak Dev Engineering College S.K. Mohapatra Thapar University, India
11:56 - 12:10	**9-5: Catalyst Attrition in the CFB Riser** A. Thon, M. Kramp, E-U. Hartge, S. Heinrich, J. Werther Hamburg University of Technology, Germany	**10.5: Numerical Investigation of Inter-Particle Friction Forces in CFB Recirculation Systems** A. Nikolopoulos, N. Nikolopoulos P. Grammelis, E. Karakas Center for Research & Technology Hellas A. Charitos Institute for Combustion & Power Plant Tech.
12:10 - 12:24	**9-6: The Relationship Between Fluidization Velocity and Segregation in Two-Component Fluidized Beds: A Preliminary Analysis** B. Formisani, R. Girimonte, V. Vivacqua University of Calabria, Italy	
12:30 - 14:00	**LUNCH**	
14:00 - 17:30	**FREE TIME / *ad hoc* SESSIONS / AFTERNOON COFFEE AT 17:00**	
	SESSION 11 **Mathematical Modeling III** Co-Chairs: R. Cocco and T. Shimizu	**SESSION 12** **Measurement Techniques** Co-Chairs: J. R. van Ommen and M. Palonen
17:30 - 17:44	**11-1: Comparison of Entrainment Rate in Acrylonitrile Reactors Using Plant Data and CFD Simulations** S. Moffatt, S. Ramchandran\ Ascend Performance Materials P. Zhao, K. Williams CPFD-Software, LLC	**12-1: Time-Resolved X-Ray Tomography of a Fluidized Bed of Geldart A Particles** R. Mudde, Q. Ricoux, E. Wagner, J.R. van Ommen Delft University of Technology The Netherlands

Wednesday, May 4, 2011 (continued)

17:44 - 17:58	**11-2: Critical Evaluation of Euler-Euler and Euler-Lagrangian Modelling Strategies in a 2-D Gas Fluidized Bed** F. Hernandez-Jimenez, A. Acosta-Iborra University Carlos III Madrid, Spain J.R. Third, C.R. Muller ETH Zurich, Switzerland	**12-2: A New Approach for Modeling of a Fluidized Bed by CFD-DEM** S. Karimi, H. Chizari, N. Mostoufi, R. Sotudeh-Gharebagh University of Tehran Iran
17:58 - 18:12	**11-3: Particle-Fluid Flow Simulations of an FCC Regenerator** S. Clark CPFD Software, USA	**12-3: Characterization of Fluidization and Mixing of Binary Mixtures Containing Biomass at Low Velocities Through Analyzing Local Pressure Fluctuations** F. Fotovat, J. Shabanian, J. Chaouki, J. Bergthorson Ecole Polytechnique de Montreal, Canada
18:12 - 18:26	**11-4: CFD Simulation of CO_2 Sorption in a Circulating Fluidized Bed Using Deactivation Kinetic Model** E. Abbasi, H. Arastoopour Illinois Institute of Technology, USA	**12-4: ECVT Imaging of 3-D Flow Structures and Solids Concentration Distributions in a Riser and a Bend of a Gas-Solid Circulating Fluidized Bed** F. Wang, Q. Marashdeh, L-S. Fan The Ohio State University, USA
18:26 - 18:40	**11-5: CFD Modeling of Fluidized Bed Reactor for the Synthesis of Dimethyl Ether** R. Kalluri, N. Akunuri, A. Jamal, R. Gupta RTI International, USA	**12-5: Description of Pressure Fluctuations in a Circulating Fluidized Bed by Statistical Analysis** R. Coetzer, A. Mostert, A. Luckos Sasol Technology, South Africa
18:40 - 18:54	**11-6: DEM Study of Fluidized Bed Dynamics During Particle Coating in a Spouted Bed Apparatus** S. Antonyuk, S. Heinrich, A. Ershova Hamburg University of Technology, Germany	**12-6: Dynamics of Gas-Solids Fluidized Beds Through Pressure Fluctuations: A Brief Examination of Methods of Analysis** S. Sasic, F. Johnsson Chalmers University, Sweden M-O. Coppens Renssalaer Polytechnic Institute, USA J. van der Shaaf, Eindhoven University of Technology, The Netherlands S. Gheorghiu, Center for Complexity Studies Romania J. R. van Ommen, Delft University of Technology, The Netherlands

Wednesday, May 4, 2011 (continued)

18:54 - 19:08		**12-7: Dynamic Characteristics of Bubbling and Turbulent Fluidization Using Hurst Analysis Technique** H. Azizpour, N. Mostoufi, R. Zarghami R. Sotudeh-Gharebagh University of Tehran, Iran
19:30 -22:15	**CONFERENCE DINNER at High Desert Museum**	
22:15 - 23:30	**POSTER SESSION, DESSERT and SOCIAL HOUR for Papers presented in Sessions 9, 10, 11 and 12**	

Thursday, May 5, 2011

07:00 - 09:00	**Breakfast**
09:00	**CONFERENCE CONCLUSON / DEPARTURES**

SPECIAL POSTER (FREE FORUM) SESSION POSTERS

P1. **Operational Experience of a 460 MWe Supercritical Circulating Fluidized Bed Boiler at Lagisza Power Plant in Poland**

A. Blaszczuk[1], W. Nowak[1], S. Ziemowit[2], J. Szvmon[2]

1 Czestochowa University of Technology
2 PKE S.A. Power Plant Lagisza

P2. **Numerical Investigation of Inter-Particle Friction Forces in CFB Recirculation Systems**

A. Nikolopoulos[1], N. Nikolopoulos[1], A. Charitos[2], P. Grammelis[1], E. Karakas[1]

1 Centre for Research and Technology Hellas
2 Institute of Combustion and Power Plant Technology, Stuttgart

P3. **Design Considerations for Dual fluidized Bed (DFB) Steam Gasifiers**

M.S. Masnadi, M.C. Stewart, J.R. Grace, X. Bi, C.J. Lim

University of British Columbia

P4. **CFD Validation of a Bubbling Fluidized Bed Reactor**

J. Sanyal, S. Ozarkar, F. Liu, L.S. Mohan

ANSYS, Inc.

P5. **Particle Clusters and Entrainment in Fluidized Beds**

R. Cocco[1], F. Shaffer[2], S.B. Reddy Karri[1], R. Hays[1], T. Knowlton[1]

1 *Particulate Solid Research, Inc.*
2 National Energy Technology Laboratory

P6. **Quantification of Riser Hydrodynamics**

R. Cocco[1], F. Shaffer[2], S.B. Reddy Karri[1], R. Hays[1], T. Knowlton[1], J. Chew[3], C. Hrenya[3]

1 *Particulate Solid Research, Inc.*
2 National Energy Technology Laboratory
3 University of Colorado

P7. **Fast Prediction of Voidage Distribution in an Industrial FCC Riser by Using the GPU-Accelerated Global EMMS Model**

X. Liu[1], J. Chen[1], W. Ge[1], J. LI[1], C. Cheng[2], Y. Xu[2]

1 Chinese Academy of Sciences
2 SINOPEC

P8. **Biological Nutrient Removal from Wastewater Using a Circulating Fluidized Bed Bio-Reactor (CFBBR)**

M. Andalib, A. Eldyasti, G. Nakhla, J. Zhu

University of Western Ontario

P9. **Modelling of Flue Gas Components Emissions During Solid Fuels Combustion in Air and Oxygen-Enriched Atmosphere in Circulating Fluidized Bed Boilers**

J. Krzywanski, T. Czakiert, W. Muskala, W. Nowak

Czestochowa University of Technology

P10. **Attrition of Bed Materials in a Lab-Scale Circulating Fluidized Bed**

G. Somma, A. Coppola, F. Scala, P. Salatino

University of Naples Federico II

P11. **Influence of the Fluidization Velocity on the Effectiveness of Hydrocarbon Conversion in a Dual Fluidized Bed Biomass Gasifier**

W.I. Diaz Castro, K. Mayer, T. Pröll, H. Hofbauer

Vienna University of Technology

P12. **PIV Measurements of a Vortex Breakdown**

M. Kraxner, F. Lauterbach, U. Muschelknautz

MCI Management Center Innsbruck