4th World Congress of Chemical Engineering

STRATEGIES 2000

Karlsruhe/Germany 16 - 21 June 1991

Preprints III

Sessions 8.1 - 9.7
Session 8.1
Fundamentals of Heat and Mass Transfer

MON 17. 6 Queens Hotel Saal Münster

Chairmen: N.N. Kulov, Moscow/USSR
H. Müller-Steinhagen, Auckland/NZ

Keynote Lectures

9.00 N. N. Kulov, Moscow/USSR 8.1 - 1
Kinetics of mass transfer at high flow rates

R.G. Carbonell, Raleigh, NC/USA
A comprehensive description of the diffusion through solid polymers

10.30 Poster Discussion Nancy Halle

8.1 - 10 Malik Alahmad, Riyadh/Saudi Arabia
Analysis of two-phase two-component heat transfer

8.1 - 11 A. S. Lamine, S. Gutsche, G. Wild, Nancy/F;
M. Nilles, H. Martin, Karlsruhe/D
Radial heat transfer in packed beds with upward single phase and two phase flow of a gas and a liquid

8.1 - 12 I. Pervez, H. Svendsen, T. Ström, T.Vassbotn, Trondheim/N
Mass transfer during highly developed turbulent flows

8.1 - 13 V.A. Maljusov, Moscow/USSR
Kinetics of some multistage separation processes

8.1 - 14 withdrawn

8.1 - 15 L. M. Rabinovich, A.V. Vyažmin, Moscow/USSR
Nonlinear surface convection and heat and mass transfer in liquid film

8.1 - 16 K.V. Koranne, R.L. Sonolikar, Nagpur/IND
A mathematical model for mass transfer with second order chemical reaction in an internally circulating drop

8.1 - 17 E.Ya. Kenig, L.P. Kholpanov, Moscow/USSR
Conjugated mass and heat transfer with reactions in multicomponent laminar falling liquid film
8.1 - 18 P. Legentilhomme, H. Aouabed, J. Legrand, Saint Nazaire/F
Mass and momentum transfer in annular swirling decaying flows

8.1 - 19 H.-P. Amaral Souto, Ch. Moyne, Vandoeuvre/F
Dispersion in periodic porous media

8.1 - 20 Y. Sano, S. Yamamoto, S. Kobuchi, Tokiwadai, Ube/J
Calculation of concentration dependent diffusion coefficient in sorption

8.1 - 21 V.R. Raghavan, Madras/IND
Heat transfer augmentation in fixed beds and fluidized beds by a gas-solid suspension

8.1 - 22 P.L. Larrieu, D. Flick, G. Gibert, Antony/F
Heat transfer to a fluid flowing between rotating cones

8.1 - 23 Z.S. Kolenda, J.S. Szmyd, Krakow/PL; K. Suzuki Kyoto/J
Numerical modeling of forced convection heat transfer processes with supplementary data

8.1 - 24 H. Bieszk, W.M. Lewandowski, Gdansk/PL
Theoretical considerations and experimental verification of influence of cylindrical screen on free convection heat transfer from a horizontal plate

Laminar free convection heat transfer from isothermal sphere

8.1 - 26 T. Dogu, N. Kader, Ankara/TR
Effect of pore structure on viscous flow and diffusion of gases through porous solids

Heat transfer to high viscous non-newtonian liquids flowing in vertical tubes

8.1 - 28 A. Woinaroschy, Bucuresti/R
New model for the dynamic simulation of multicomponent rectification process
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<td>E.I. Vorobjov, J.V. Anikeev, V.M. Samolyotov, Kiev, Ukraine/USSR</td>
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<td>Dynamics of filtration and compression. New methods of the process combined analysis and calculation with due account of the cake consolidation dynamics and the filter medium compressibility</td>
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<td>Design of continuous thickener from a batch test of sedimentation</td>
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<td>Particle-to-fluid heat transfer in packed beds: An example for the interdependence between standard experiments and mathematical models in chemical engineering</td>
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<td>V.M. Barabash, Leningrad/USSR</td>
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<td>Hydrodynamic and mass exchange in mixing of gas-liquid system</td>
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<td>V.Z. Prodanovic, K.T. Raic, V.L. Knezic, S.D. Cvijovic, Beograd/YU</td>
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<td>General approximate velocity distribution equation of a laminar flow between parallel plates</td>
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<td>C. Chiranjivi, Y.S.P. Narayana Rao, Waltair/IND</td>
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<td>A novel correlation of convective heat transfer data for the design of heat exchangers with short circular and non-circular flow geometrics</td>
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<td>Gu Mingxing, Yu Kuotsung, Tianjin/PRC</td>
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<td>A heterogeneous statistical model for adsorption equilibria of aromatic mixtures on zeolites</td>
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<td>A. Chakma, Calgary, AL/CDN</td>
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<td>Mass transfer characteristics of a jet adsorber</td>
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8.2 - 11  S. Poncin, N. Midoux, A. Laurent, Nancy/F  
Hydrodynamics and residence time distribution 
in a countercurrent slurry bubble column 
partitioned with sieve plates

8.2 - 12  N.S. Manthapurwar, D.H. Maiske, R.L. Sonolikar, 
Nagpur/IND  
Mathematical modeling and simulation of 
venturi scrubbers

8.2 - 13  K. Molnár, Budapest/H  
Three-phase fluid disperse systems for gas/liquid 
phase countercurrent contacting

8.2 - 14  N. Kanamaru, S. Urano, N. Kinoshita, K. Ota, 
C. Nishino, Tokyo/J  
PSA process for removing CO₂ and CH₄ from SNG

8.2 - 15  M.O. Musoyan, Y.A. Ganiev, Y.L. Rastorguyev, 
Grozny/USSR  
Thermal conductivity of NaCl- H₂O solution at 
wide range of parameters of state

8.2 - 16  J.A. Lugo, J.G. Briano, Mayaguez/PR  
Viscosity of liquid hydrocarbons: Continuous 
mixture approach

8.2 - 17  Hongqin Liu, Wenchuan Wang, Beijing; 
Jianhou Zhang, Tianjin/PRC  
The liquid viscosity of pure substances and 
mixtures under ordinary and high pressures
Session 8.3
Trends in Heat Exchange

TUE 18. 6 Queens Hotel Saal Münster

Chairmen: R.A. Buonapane, Boston, MA/USA
K. Stephan, Stuttgart/D

Keynote Lecture
9.00 H. Müller-Steinhagen, Auckland/NZ 8.3 - 1
Heat exchanger fouling: Money, mechanisms and mitigation

10.00 Poster Discussion Nancy Halle

8.3 - 10 Q. Zhao, D.C. Zhang, S.P. Li, D.Q. Xu,
G.B. Zhang, J.F. Lin, Dalian/PRC
New surface materials with dropwise condensation

8.3 - 11 R. A. Buonapane, Boston, MA/USA;
H. D. Huang, Tianjin/PRC; Y.T. Li, B. Yundt;
Acton, MA/USA
Orbital tube evaporator
A new technology for water desalination

8.3 - 12 D.F. Ilten, Frankfurt am Main/D
Thermal physical property data and studies of fouling in heat transfer

8.3 - 13 M. Sadrameli, Tehran/IR
Heat transfer coefficient determination in asymmetric and unbalanced regenerators

8.3 - 14 J. Guderian, D. Köneke, P.-M. Weinspach,
Dortmund/D
Heat transfer in tube-bundle heat exchangers, loaded by free falling particles

8.3 - 15 S. Mori, M. Kobayashi, K. Takahashi,
A. Tanimoto, Kanazawa; M. Sakakibara, Fukui/J
Conjugate heat transfer from a forced flow in a vertical circular tube to external fluid

8.3 - 16 V.N. Slesarenko, Vladivostok/USSR
The theoretical model and boiling characteristics of small multitube bundles

8.3 - 17 U. Wenzel, H. Müller-Steinhagen, Auckland/NZ
Subcooled flow boiling heat transfer to mixtures
8.3 - 18  N.K. Mitra, Bochum/D  
Numerical simulation of flow and heat transfer on the fin-sides of a fin-tube heat exchanger

8.3 - 19  R. Kukral, K. Stephan, Stuttgart/D  
Dynamic simulation of shell-and-tube heat exchangers within DIVA

8.3 - 20  G. Gaiser, V. Kottke, Stuttgart/D  
Development of new plate heat exchangers for chemical and food industry

8.3 - 21  M.T. Targett, W.B. Retallick, West Chester, PA; St.W. Churchill, Philadelphia, PA/USA  
The incineration of contaminants in air with a spiral heat exchanger/catalytic reactor

8.3 - 22  R. Rawlins, K.D. Timmerhaus, R. Radebaugh, Boulder, CO/USA  
Regenerator characterization in a pulse-tube refrigerator

8.3 - 23  - withdrawn -

8.3 - 24  I. Radez, Novo Mesto, T. Koloini, Ljubljana/YU; V. Hudcova, Praha/CS  
Heat transfer in aerated and non-aerated mycelial fermentation systems in stirred tank reactor

8.3 - 25  D. Gorenflo, P. Sokol, Paderborn/D  
Heat transfer with pool boiling of new refrigerants

8.3 - 26  C. Jimeno, M.C. Palancar, J.M. Aragón, G. Ruiz, Madrid/E  
Distribution of convection coefficients in rods of spent nuclear fuel
Session 8.4
Optimum Design and Pinch Technology

Workshop: Organised by: J.P. Gourlia, Solaize/F

WED 19.6 Queens Hotel Saal Münster

Chairmen: J.P. Gourlia, Solaize/F

Oral Presentations

14.00 J.P. Gourlia, Solaize/F 8.4 - 1
Optimal design and pinch technology

14.30 B. Kalitventzeff, F. Maréchal, Liège/B 8.4 - 2
Process retrofit - incentives for using pinch technology concepts and adequate computer tools

15.00 B. Linnhoff, Knutford/Cheshire/UK 8.4 - 3
Batch processes: optimal design and pinch technology

15.30 B. Bolio, I. E. Grossmann, T.F. Yee, Pittsburgh, PA/USA 8.4 - 4
SYNHEAT: a program for simultaneous optimization for heat exchanger network synthesis

16.00 S.J. Stanley, Bloomfield, NJ; R.M. Venner, Houston, TX/USA 8.4 - 5
Revamp of the world scale ethylene unit

16.45 Poster Discussion Nancy Halle

8.4 - 10 T. K. Zhelev, Y. M. Markov, Sofia/BG
Optimal synthesis of heat exchanger networks when the piping cost is taken into account

8.4 - 11 M. Ishida, Chia-Chin Chuang, R. Taprap, Yokohama/J
Process system synthesis by using energy utilization diagrams

8.4 - 12 P. Glavic, Maribor/YU
Energy integration of chemical processes

8.4 - 13 Z. Fonyo, E. Rev, P. Mizsey, Zürich/CH
Heat exchanger network synthesis at different heat transfer conditions: the diverse pinch concept
8.4 - 14 J. Jezowski, Wroclaw/PL
SYNHEN - Microcomputer-oriented package of programs for heat exchanger networks synthesis

8.4 - 15 V. J. D'Amico, Houston, TX; L. A. Smith Jr., E. M. Jones, Pasadena, TX/USA
Aromatic alkylation via catalytic distillation

8.4 - 16 J. Rivas Puerta, V. Hartmann, Porto Ordaz/YV
Reconditioning of Interalumina (Venezuelan bauxite refinery) to treat its native ore

8.4 - 17 R. Rodriguez Perez, G. Bañuelos Miron, Mexico, D.F./MEX
Advances in acetonitrile purification

8.4 - 18 - withdrawn -

8.4 - 19 G. Saracco, M. Onofrio, G. Genon, Torino/I
Recovery of nitric acid from pickling spent solutions
Session 8.5
Drying

THU 20.6. Queens Hotel Saal Münster

Chairman: M. Roques, Nancy/F

Keynote Lecture

9.00 M. Roques, Nancy/F 8.5 - 1
A decennium of research in drying

10.00 Poster Discussion Nancy Halle

8.5 - 10 A. A.J. Ketelaars, W.J. Coumans, P.J. A.M. Kerkhof, Eindhoven/NL
Modeling the drying behaviour of clays

8.5 - 11 A. Sloth Jensen, Søborg/DK
Drying of particles in superheated steam under pressure

8.5 - 12 J.C. Laguerre, G. Trystram; A. Lebert, J.J. Bimbenet, Massy/F
Foodstuff drying curves with variable conditions modeling and interpretation

8.5 - 13 B.R. Bhandhari, E.D. Dumoulin, A.M.J. Lebert, I. Noleau, H.M. Richard, Massy/F
Drying of flavour compounds by leaflash spray drying technique
Session 9.1
Gravity Flow of Particulate Solids
Part 1: Characterization of flow properties of particulate solids

Workshop: Organised by the EFChE WP Mechanics of Particulate Solids

WED 19. 6.   Konzert-Haus Saal C

Chairmen: J. Novosad, Praha/CS
           J. Schwedes, Braunschweig/D

Keynote Lectures

9.00 J. Schwedes, Braunschweig/D  9.1 - 1
Flow properties of particulate solids

9.45 B. Scarlett, Delft/NL  9.1 - 2
Establishment of powder reference material

10.30 Poster Discussion Nancy Halle

9.1 - 10 A. Birks, London/UK
The use of the theoretical failure locus equation in characterization and in curve-fitting of shear cell test data

9.1 - 11 M. Nowak, J. Schwedes, Braunschweig/D
Measurement of the stress-strain behaviour of cohesive limestone with the true biaxial shear tester

9.1 - 12 G. G. Enstad, L.-P. Maltby, Porsgrunn/N
Characterization of flow properties of particulate solids by means of a biaxial tester

K. Shinohara, Sapporo/J
Prediction of segregation during filling of silos

9.1 - 14 withdrawn

9.1 - 15 A.R. Mason, A.J. Matchett, Cleveland/UK
Friction and adhesion at bulk solids/wall interfaces

9.1 - 16 B. Aremu, R. Ahart, C. Irwin, Edgewater, NJ/USA
G.I. Tardos, New York, NY/USA
The influence of fine solid additives (flow aids) on the handling and storage properties of cohesive powders
9.1 - 17  A. Sangiradi, G. Hsu, Ch. Irwin, G. I. Tardos, Edgewater, NJ/USA
The influence of processing on the flow and bulk properties of granules

9.1 - 18  J. Tomas, H. Schubert, Freiberg/D
Correlation between selected properties of particulate solids, flow behaviour and silo plant design

9.1 - 20  J. Grochowicz, E. Kusińska, Lublin/PL; W.K. Bilanski, Guelph, ONT/CDN
Mass exchange in adjacent layers of material stored in silos

9.1 - 21  A.V. Katalymov, B.V. Matseevitch, U.L. Polunov, Moscow/USSR
Evaluation of the bulk solid stress state for the case of varying bulk material density
Session 9.1 (cont.)
Part 2: Research in flow of particulate solids

WED 19. 6. Konzert-Haus Saal C

Chairman: J. Novosad, Praha/CS

Keynote Lectures

14.00 H. Buggisch, G. Gudehus, Karlsruhe/D 9.1 - 3
Aspects of silo research in Karlsruhe

14.45 M. C. Roco, Washington, DC /USA 9.1 - 4
Trends for particulate flow research in USA

15.30 Poster Discussion Nancy Halle

9.1 - 22 J.Y. Ooi, J.M. Rotter, Edinburgh/UK
Mechanical behaviour of wheat during flow

9.1 - 23 J. Y. Ooi, J. M. Rotter, Edinburgh/UK;
J. Munch-Andersen, J. Munch-Andersen, Copenhagen-Horsholm/DK
Variability of flow pressures in prototype grain silos

9.1 - 24 H. Buggisch, M. Renner, Karlsruhe/D
Wave phenomena in rapid flows of granulated materials

9.1 - 25 G. Gudehus, Karlsruhe/D; J. Tejchman, Gdansk/PL
Some mechanisms of a granular mass in a silo - model tests and a numerical Cosserat approach

9.1 - 26 G. Gudehus, H. Hügel, Karlsruhe/D
Dynamic model for self-exciting oscillations during silo discharging

9.1 - 27 C. Thornton, Birmingham/UK
Computer simulated hopper flow

9.1 - 28 K. Runesson, M. Klisinski, Göteborg/S
A flow model for granular material and its finite element simulation

9.1 - 29 R. Kitamura, G. Kisanuki, Kagoshima/J
Modeling of flow behaviour of particulate material

9.1 - 30 A. S. Kuznetsov, Leningrad/USSR
A mathematical model of granular dilatant material and a numerical method for calculation of steady gravity flow through hoppers

9.1 - 31 F. Ebert, G. Dau, Kaiserslautern/D
Measurement of residence time distributions of granular materials in silos and silo-type apparatus
9.1 - 32  H. Takahashi, T. Takeuchi, Muroran/J  
The analysis of solids flow in iron making blast furnace based on plasticity theory

9.1 - 33  B. Lindau, R. Herbig, I. Gottschalk, Dresden/D  
Continuous systematic mixing of bulk materials by controlled mass flow

9.1 - 34  R.Z. Adinberg, V.V. Dilman, Sverodonetsk/USSR  
Self-regulating of solid spheres systems under the conditions of gravitational movement

9.1 - 35  A.N. Isaenko, Zaporozhye/USSR  
Simulation of the velocity field of a granular material under gravitation flow out from a technological bunker

9.1 - 36  M. Generalov, Moscow/USSR  
Theory of bulk solids flow from bunkers

9.1 - 37  D.O. Bytev, A.I. Zaitsev, Yaroslavl/USSR  
Flow behaviour of particulate solids and dynamic inhomogeneity in mixers

9.1 - 37  A  H. Takeuchi, Sapporo/J  
X-ray investigations of flowing particles around tube banks in a moving bed
**Session 9.1 (cont.)**

**Part 3: Design of silos for strength and flow**

**THU 20. 6.** Konzert-Haus Saal C

Chairman: J. Novosad, Praha/CS

**Keynote Lectures**

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<td>9.00</td>
<td>A. W. Roberts</td>
<td>Newcastle/AUS</td>
<td>Self induced and energy excited gravity flow of particulate solids in silos and channels - An overview</td>
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<td>9.45</td>
<td>J. Eibl</td>
<td>Karlsruhe/D</td>
<td>Silo design for strength</td>
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**10.30** Poster Discussion  
Nancy Halle

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<td>H. Firewicz</td>
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<td>Particulate solids flow through orifices - Part 2: Adjustment for angled orifices</td>
<td>J.M. Gregory, C.B. Fedler, R.S. Narayan</td>
<td>Lubbock, TX/USA</td>
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<td>Role of powder characteristics and flowmeter's variables on the flow of metal powder</td>
<td>P. Singh, Madras; P. Ramakrishnan</td>
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<td>Experimental study and interpretation of the response of a non-mechanical L-valve</td>
<td>A. Ould-Dris, Y. Molodtsof, J.F. Large</td>
<td>Compiègne/F</td>
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<td>Characteristics of aerated granular materials discharging from standpipe with an orifice</td>
<td>T. Takeshita, K. Atsumi, Hamamatsu; G. Jimbo</td>
<td>Nagoya/J</td>
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<td>9.1 - 45</td>
<td>G.G. Kuvshinov, Novosibirsk/USSR</td>
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<td>An elementary theory of particulate solids effluction through orifice at gas countercurrent</td>
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<td>A.G. McLean, Wollongong/AUS; J.K. Walters, Nottingham/UK</td>
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<td>Loads in an experimental silo fitted with a tremmie tube</td>
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<td>C. Lyle, J. Schwedes, Braunschweig/D</td>
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<td>M. Ghadiri, C.M. Martin, Guildford/UK</td>
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<td>The electrochemical valve for solids</td>
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<td>C.C.J. Shih, D.L. Hulse, Brea, CA/USA</td>
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<td>A novel process to cool a bulk of solids having low permeability</td>
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<td>A. A. Murashov, O.T. Pukhty, Yaroslavl/USSR</td>
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Session 9.2
Dispersed Multi-Phase Flows in Pipes

Workshop: Organised by the EFChE WP Multiphase Fluid Flow

THU 20.6  Konferenz-Haus Saal 1

Chairmen:  M. Giot, Louvain-la-Neuve/B
           D. Mewes, Hannover/D

Oral Presentations

9.00  P. Andreussi, Pisa/I  9.2 - 1
      Flow regime transition in near horizontal gas-liquid pipe

9.30  B.J. Azzopardi, Nottingham/UK  9.2 - 2
      A review of recent work on division gas-liquid flow at junctions

10.15 Poster Discussion  Nancy Halle

9.2 - 10  - withdrawn -

9.2 - 11  E. Grolman, P.J. Hamersma, J.M.H. Fortuin, Amsterdam/NL
          Gas-liquid flow in slightly inclined pipes

9.2 - 12  J. Hart, J. Ellenberger, P.J. Hamersma, J.M.H. Fortuin, Amsterdam/NL
          Drag reduction in gas liquid pipe flow with a small liquid holdup

9.2 - 13  D. Mewes, H. Herm-Stapelberg, F. Mayinger, Hannover/D
          Multi-phase flow of oil-water-gas mixtures in pipeline systems of off-shore production facilities

9.2 - 14  C.M. Narayanan, Durgapur/IND
          Transport phenomena in polymer solutions and suspensions flowing through tubes of tortuous wall geometry

9.2 - 15  K. Erdész, Veszprém/H
          Development of new types of vibrational processing equipment
Session 9.3
The Measurement of Submicron Particle

Workshop: Organised by the EFChE WP Characterisation of Dispersed Systems

THU 20.6 Konzerthaus Saal C

Chairmen: R. Davis, Newark, DE/USA
L. Leschonski, Clausthal-Zellerfeld/D

Keynote Lecture

13.30 B. Scarlett, Delft/NL
Molecules to micrometers - four decades

Oral Presentations

14.15 R. Polke, Ludwigshafen/D
The relevance of particle measurement technology to process engineering

14.45 T. Allen, R. Davies, Newark, DE/USA
Evaluation of instruments for submicron particle size analysis

15.15 G. Larcher, Decines/F
A comparative study of laser diffraction instruments for submicron particle size analysis

15.45 H. Fiban, Duisburg/D
On-line determination of physical properties of submicron particles

16.15 J. Gebhardt, Frankfurt am Main/D
Influence of particle shape on light scattering

16.45 J. Dodds, Nancy/F
Chromatographic methods for submicron particle size measurement

17.15 J. Lesec, Paris/F
Size measurement of submicron particles using photon correlation spectroscopy

17.45 R. Weichert, Clausthal-Zellerfeld/D
Submicron particle size analysis by multiple wavelengths photosedimentation
Session 9.4
Finely Dispersed Materials - Requirements and Production

Workshop: Organised by the EFChE WP Comminution, Agglomeration, Classification

MON 17.6. Konzerthaus Saal C

Chairmen: E. Forssberg, Lulea/S
K. Schönert, Clausthal-Zellerfeld/D

Oral Presentations

14.00 Introduction

14.10 A. Kerber, Waldshut/D; H. Hofmann, Neuhausen/CH
Powder characteristics and properties of derived high performance structural ceramics

14.40 S. Wolff, Wesseling/D
Carbon blacks and silicas for the rubber industry

15.10 T.R. Jones, St. Austell, Cornwall/UK
What makes a mineral pigment useful in the manufacture of paper?

16.00 R. Polke, N. Scholz, R. Stadler, Ludwigshafen/D
Finely dispersed materials by milling and classification

16.30 Y. Reichardt, K. Schönert, Clausthal-Zellerfeld/D
Breakage behaviour of very fine particles in interparticle stressing

16.45 H. Heegn, Freiberg/D
Activation of solids by grinding

17.00 F. U. Schneider, H. Hoberg, N. Fenten, Aachen/D
Ultrafine grinding with solid additives

17.15 K. Leschonski, Clausthal-Zellerfeld/D
Classification with small cut sizes
Session 9.4 (cont.)

TUE. 18.6. Konzerthaus Saal C

Chairmen: E. Forssberg, Lulea/S
           K. Schöner, Clausthal-Zellerfeld/D

Oral Presentations

9.00  C. Bernhardt, Freiberg/D  9.4 - 9
      Wet ultra-fine grinding in stirred ball mills - problems and recent results

9.15  F. Delle, J. Leluschko, K. Kirchner, Frankfurt am Main/D  9.4 - 10
      Wet and dry grinding of very fine particles in ball mills

9.30  R. Nied, Bonstetten/D  9.4 - 11
      Wet jet mill, a new concept for contamination-free fine grinding

10.30 Poster Discussion Nancy Halle

9.4 - 12 J.A. A. Bajalan, F. A. Hummadi, Baghdad/IQ
         Dry grinding in a small ball mill using white cement clinker fractions 4,3,2, and 1mm

9.4 - 13 G. Peev, L. Zambov, Sofia/BG
         Modeling and optimization of low-pressure chemical vapour deposition of polycrystalline silicon and Si$_3$N$_4$ films

9.4 - 14 M. Bottlinger, Quakenbrück; H. Umhauer, Karlsruhe/D;
         Particle size analysis of irregularly shaped particles: shape influence on scattered light analysis and comparison with other sizing methods
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<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
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<tr>
<td>9.00</td>
<td>Keynote</td>
<td>The visible bubble flow rate as real controlling parameter for fluidized bed operation</td>
<td>J. Baeyens, P. van Rompay, S.Y. Wu, Heverlee/B</td>
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<td>10.00</td>
<td>Poster</td>
<td>Gas mixing characteristics of a pilot scale circulating fluidized bed</td>
<td>E.-U. Hartge, M. Kruse, J. Werther, Hamburg/D; W. Nowak, Czestochowa/PL</td>
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<td>Solids circulation rates in an internal circulating fluidized bed</td>
<td>F. Berrutti, A. Jamaluddin, L.A. Behie, Calgary, AL/CDN</td>
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<td>Experimental investigation of flow regime transition</td>
<td>Yongrong Yang, Gantang Chen, Shunxi Rong, Hangzhou, Zhejiang/PRC</td>
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<td>Mixing of solid particles in shallow fluidized beds</td>
<td>Shunxi Rong, Junqun Jiang, Yongrong Yang, Hangzhou, Zhejiang/PRC</td>
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<td>Bubble and radial dispersion characteristics in three phase fluidized beds</td>
<td>Joo Hee Han, Sang Done Kim, Seoul/ROK</td>
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<td>Determination of the hydrodynamic parameters characterizing three phase fluidized beds</td>
<td>M. Roustan, B. Capdecille, V. Bigot, I. Guyot, D. Bataille, Toulouse/F</td>
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<tr>
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<td>Measurement and characterization of transient forces of solid particles in fluidized beds</td>
<td>H.O. Kono, Morgantown, WV/USA</td>
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9.5 - 18  I. Penchev, J. Hristoy, Sofia/BG
Fluidization in spherical vessels

9.5 - 19  G.V. Reddy, S. Prasad, Dhanbad/IND
A multistage three-phase mathematical model for fluidized bed coal combustors

9.5 - 20  L. Mleczko, Bochum/D
Fluidized bed reactor models for oxidative coupling of methane to higher hydrocarbons

9.5 - 21  Yonrong Yang, Bochuan Chen, Gantang Chen, Shunxi Rong, Hangzhou, Zhejiang/PRC
Experimental determination of bubble fraction in fluidized beds

9.5 - 22  H.J. Feindt, H. Weinstein, New York, NY/USA
Fluctuations in solid fraction in a high velocity fluidized bed

9.5 - 23  A. Grigorescu, G. Ivanus, Gr. Pop, Bucharest/RO
Advanced fluidized bed procedure for chemical processes over zeolite catalysts

9.5 - 24  Ching-Yeh Shiau, Taipei, Taiwan/ROC
An improved bubble assemblage model for fluidized bed catalytic reactors

9.5 - 25  D.S. Povrenović, Z.B. Grbavić, D.V. Vuković, Belgrad/YU
Spout-fluid bed and microwave heating drier

9.5 - 26  D.G. Karamanev, L.N. Nikolov, Sofia/BG
Hydrodynamics of two-phase inverse fluidized bed

9.5 - 27  M. Sciazko, Zabrze; L. Troniewski, R. Ulbrich, Opole/PL
Measurement of pressure drop fluctuations in fluidized beds

Entrainment and transport velocity in fast-fluidized beds

9.5 - 29  V.N. Korolyov, I.A. Osintsev, A.V. Ostrovskaja, Sverdlovsk/USSR
Mass transfer in two-stage heating fluidized beds

9.5 - 30  B. Buczek, Krakow/PL; O.E. Potter, Clayton, VIC/AUS
Chemical reaction in the circulating fluidized bed

9.5 - 31  H. Möller, Hamburg/D
The development of a dense phase pneumatic transport system with low speed material movement
9.5 - 32  E. Muschelknautz, M. Trefz, Stuttgart/D
Gas flow and separation in big cyclones at high solids concentration

9.5 - 33  H. Takahashi, T. Takeuchi, Muroran/J
Performance of a moving bed dust collector by a cross flow of gas

9.5 - 34  J.M. Aragon, J.M. Cabeza, T. Tamayo, Madrid/E
Pressure fluctuations in fluidized beds. Methods of digital treatment of signals

9.5 - 35  G.G. Kuvshinov, Yu.I. Mogilnykh, Novosibirsk/USSR
Statistical simulation of a fluidized bed reactor with separate feed of reactants

9.5 - 36  Zumao Chen, Chong Zheng, Beijing/PRC
Mass transfer in different flow regimes of three-phase fluidized beds

9.5 - 37  M. Derczynski, Z. Bis, W. Gajewski, W. Nowak, Czestochowa/PL
Effect of sonic energy on fluidization and heat transfer of fine particles

9.5 - 38  D. Ziołkowski, J. Michalski, Warsaw/PL
Modeling of aerodynamic properties of fluidized phase generated in organized system with packed bed

9.5 - 39  Lii-ping Leu, Wen Yu Chiu, Bing-Bing Gua, Taipei/ROC
Transition from slugging to turbulent flow regime in fluidized bed by using pressure fluctuation signals

Two-stage swirl-flow fluidized bed coal combustion

9.5 - 41  M. Del Pozo, A. Gervais, C.L. Briens, London, ONT/CDN; G. Wild, Nancy/F
Effect of liquid coalescing properties on mass and heat transfer and hydrodynamics in three-phase fluidized bed

9.5 - 42  Th. Vitidsant, S. Damronglerd, Bangkok/T
Computer control on temperature of reaction of propane-steam reforming of Ni-alumina catalyst in fluidized bed

9.5 - 43  R. Korbee, J.C. Schouten, C.M. van den Bleek, Delft/NL
Regenerative off-gas cleaning by means of an interconnected fluidized bed system
Session 9.6
Complex Fluid Systems

THU 20.6. Nancy Halle

9.00 Poster Presentations

9.6 - 1 - withdrawn -

9.6 - 2 - withdrawn -

9.6 - 3 - withdrawn -

9.6 - 4 L. Etcheto, A.M. Billet, P. Guiraud, J. Costes, Toulouse/F
Comparison of mixing performance between tee and axisymmetric mixers

9.6 - 5 M. Tolley, V. Halloin, P. Chiwy, Bruxelles/B
Viscous laminar flow in a forehearth model

9.6 - 6 E. Obata, H. Takahashi, K. Ando, Muroran/J
Measurement of particle size distribution by liquid-fluidization

9.6 - 7 - withdrawn -

9.6 - 8 R.L. Isyemin, N.B. Kondukov, L.I. Frenkel, Tambov/USSR
Specific features of heat transfer mechanism in the fluidized bed of large particles

9.6 - 9 M. Soltanieh, Tehran/IR
Transient dispersion in laminar tube flow

9.6 - 10 F. Larachi, A. Laurent, N. Midoux, Nancy/F
Comparative hydrodynamic study of fixed bed operated under high pressure both in downflow and upflow

9.6 - 11 N. Zannoud, P. Guiraud, J. Costes, J. Bertrand, Toulouse/F
Mixing in tubular reactor and agitated vessel: local concentration measurement by laser induced fluorescence

9.6 - 12 K. Murase, H. Shibata, Y. Yasuda, M. Nakamura, S. Toyama, Nagoya/J
The shape and stability of captive films and drops between two cylinders and between two spheres

9.6 - 13 L.D. Plyatsuk, O.S. Balabekov, Chimkent/USSR
Cocurrent flow mass transfer apparatus with regular movable pecking
Session 9.7
Rheology

Workshop: Organised by H. Buggisch, Karlsruhe/D

MON 17.6. Konzerthaus Saal C

Chairmen: H. Buggisch, Karlsruhe /D
    H.H. Winter, Amherst, MA/USA

Oral Presentations

9.00 J. Mewis, Leuven/B 9.7 - 1
Suspension rheology

9.30 L. Rubart, G. Böhme, Hamburg/D 9.7 - 2
Numerical methods in non-Newtonian fluid mechanics

10.00 J. Meissner, Zürich/CH 9.7 - 3
Polymer melt elongation

10.30 H.H. Winter, Amherst, MA/USA 9.7 - 4
Exploring the liquid-solid transition in polymer gels and long linear polymers

11.15 Poster Discussion Nancy Halle

9.7 - 10 Rong-Yeu Chang, Wen-Lii Yang, Hsinchu /ROC
Simulation of viscoelastic fluids of the integral type using the finite element method with satisfied conservation equations

9.7 - 11 W. Sokol, C.L.C. Migiro, Dar-es-Salaam/EAT
Stability of thin films of non-newtonian liquid flowing vertically down a solid surface

9.7 - 12 C. Gallegos, M. Berjano, J. Munoz, A. Guerrero, V. Flores, Sevilla/E
Non-linear viscoelastic behavior of a mayonnaise

CAR for rheological complex fluids and their application to flow processes in equipments of chemical engineering

9.7 - 14 M. Suffern, Hawthorn/AUS
Effect of drag reducing agents on centrifugal pump efficiencies
9.7 - 15 J. Comiti, M. Hilal, Saint-Nazaire/F
Determination of pressure drop for shear thinning purely viscous fluid flow through porous media

9.7 - 16 E. Windhab, Quakenbrück/D
Mechanical properties and stability of food foams

9.7 - 17 E. Windhab, B. Wolf, Quakenbrück; V. Denk, H. Nirschl, Freising/D
Stress-strain relationship of small deformable bodies under steady and unsteady flow conditions in newtonian and viscoelastic media

9.7 - 18 Rm. Muthiah, V.N. Krishnamurty, Trivendrum; B.R. Gupta, Kharagpur/IND
Rheology of hydroxyl terminated polybutadiene propellant slurry