

CONTENTS

1. Liquid Disintegration / Spray Formation

A Continuous Modelling Approach for Describing the Atomization Process from Inside the Injector to the Final Spray

G. Blokkeel¹, A. Mura², F-X. Demoulin³, R. Borghi⁴

1. PSA Peugeot Citroën, France

2. CORIA-CNRS, Saint Etienne du Rouvray, France

3. CORIA-University of Rouen, France

4. LMA-ESM2, Marseille, France 1-1

Stochastic Modeling of the Drops Breakup in LES with Atomizing Spray

M. Gorokhovski¹, S. Apte²

1. CORIA UMR 6614 CNRS University of Rouen, Site Universitaire du Madrillet, France

2. Center for Turbulence Research, Stanford University, USA..... 1-2

Modelling of Shear-Driven Liquid Wall Films on Curved Surfaces: Effect of Accelerated Air Flow and Variable Film Load

J. Ebner, P. Schober, O. Schäfer, S. Wittig

Lehrstuhl und Institut für Thermische Stromungsmaschinen Universität Karlsruhe, Germany 1-3

Disturbance Growth in Primary Atomization: Three-Dimensionality, Transient Amplification and Non-Parallel Flow Effects

P. Yecko

Biosphere 2 Center, Columbia University, Arizona, USA 1-4

A Cylindrical, non-Newtonian Liquid Jet Undergoing Linear Breakup

V. Dravid, P.E. Sojka

Maurice J. Zucrow Laboratories, School of Mechanical Engineering, Purdue University, USA..... 1-5

A Flat, non-Newtonian Liquid Sheet Undergoing Linear Breakup

V. Dravid, P.E. Sojka

Maurice J. Zucrow Laboratories, School of Mechanical Engineering, Purdue University, USA..... 1-6

A Problem of Global Instability of Plane Liquid Jets

L. De Luca, C. Caramiello

DETEC, Università “Federico II” di Napoli, Italy 1-7

On the Surface Deformation of a Liquid Jet Ejected from Semi-Turbulent Pipe Flow

W. Mayer¹, E. Laurien², E. Khalifa², M. Schüler³

1. German Aerospace Center, DLR Lampoldshausen, Germany

2. University of Stuttgart, IKE Department of Thermofluidynamics, Stuttgart, Germany

3. Guest Student at DLR, University of Stuttgart, Germany 1-8

Atomization Behavior on the Top of Upward Liquid Jet

M. Arai, S.M. Hamamura, M. Saito, K. Amagai

Dept. of Mechanical System Engineering, Gunma University, Japan 1-9

Disintegration of Hot Water Jet from a Pinhole Nozzle

N. Iki, T. Ebara

National Institute of Advanced Industrial Science and Technology, Japan..... 1-10

Atomisation of Very Viscous Liquids

F. Campanile, B.J. Azzopardi

Multiphase Flow Research Group, School of Chemical, Environmental and Mining Engineering,

University of Nottingham, UK..... 1-11

Viscosity Effect on the Break-up of a Liquid Jet in a Cross Airflow*M. Birouk¹, B. J. Azzopardi², T. Stähler³*

1. Department of Mechanical and Industrial Engineering, University of Manitoba, Canada

2. School of Chemical, Environmental and Mining Engineering, University of Nottingham, U.K.

3. Institut für Thermische Stromungsmaschinen, University of Karlsruhe, Germany..... 1-12

Momentum Coherence Breakdown of Bending Atomizing Liquid Jet*R. Ragucci¹, A. Bellofiore², G. Carulli², A. Cavaliere²*

1. Istituto di Ricerche sulla Combustione - C.N.R., Napoli, Italy

2. Dip. Ingegneria Chimica - Università degli Studi di Napoli Federico II, Italy..... 1-13

Influence of the Air and Liquid Channel Thickness on the Oscillation Behavior of an Air-blasted Liquid Sheet*C. Siegler, A. Lozano, F. Barreras*

LITEC/CSIC, Zaragoza, Spain 1-14

On The Non Monotonic Recess Effect On Coaxial Atomization*A. Dunand, J.L. Carreau, F. Roger*

Laboratoire de Combustion et Détonique CNRS UPR 9028, University of POITIERS, France..... 1-15

Effect of Solid Particles on Break-up of Suspension Sheets*B. Mulhem, G. Schulte, A. Abu Ali*

Chemical Engineering Department, University of Bremen, Germany..... 1-16

A Fundamental Study of Liquid Sheet Breakup and its Relationship to GDI Sprays*M.S. Goodwin, G. Wigley*

Aeronautical & Automotive Engineering Department, Loughborough University, UK..... 1-17

Flashing Injection of CO₂-Dissolved Mixture*A. Rashkovan¹, B. Rivin¹, V. Kholmer², E. Sher¹*

1. Department of Mechanical Engineering, Ben-Gurion University of the Negev, Israel

2. The Negev Academic College, Beer-Sheva, Israel 1-18

The Vibrational Excitation of Conical Liquid Sheets for the Control of Spray Formation*Z. Prebeg¹, G. Brenn², F. Durst¹*

1. University of Erlangen-Nürnberg, Germany

2. Graz University of Technology, Austria 1-19

Jet Transition and Rainout from Large Superheated Spray Releases*V. Cleary, P.J. Bowen, A. Maragkos*

Division of Mechanical Engineering and Energy Studies, Cardiff University, UK..... 1-20

Spray Formation by Bi-Component Liquid Flashing: A Theoretical Approach*T. Bar-Kohany, E. Sher*

Department of Mechanical Engineering, Ben-Gurion University of the Negev, Israel..... 1-21

Stochastic Treatment of Perforation Phenomenon Induced by Laminar-Turbulent Transition in a Thin Liquid Sheet*T. Azuma, T. Wakimoto*

Dept. of Mechanical Engineering, Osaka City University, Japan 1-22

Experimental Characterisation of Spray-Wall Interaction Under Cross-Flow Conditions*M.R. Panão, A.L.N. Moreira*

Department of Mechanical Engineering, Instituto Superior Técnico, Lisboa, Portugal..... 1-23

Film Thickness and Velocity Distribution in a Splash-Plate Atomizer: Comparison Between Simulations and Experiments*M.P. Fard¹, N. Ashgriz², J. Mostaghimi², D.M. Levesque³, S. Morrison³*

1. Simulent Inc., Toronto, Canada

2. Mechanical Engineering, University of Toronto, Canada

3. Alstom Canada..... 1-24

Visualisations of Liquid Breakup by Fuel Slingers*W.J.A. Dahm¹, P.R. Patel², B.H. Lerg²*

LTC, Department of Aerospace Engineering, The University of Michigan, USA..... 1-25

2. Spray Modelling

Multiple Numerical Solutions of Structures of Counterflowing Spray Flames

E. Gutheil

Interdisziplinäres Zentrum für Wissenschaftliches Rechnen, Universität Heidelberg, Germany2-1

Numerical Analysis of One-Dimensional Atomization Model Described by Eulerian Type Equations

K. Amagai, N. Ueno, M. Arai

Dept. of Mechanical System Engineering, Gunma University, Japan2-2

Modelling of Turbulent Atomisation with an Euler/Euler Approach Including the Drop Size

Prediction

E. Platzer, M. Sommerfeld

Department of Engineering Science, Martin Luther University Halle-Wittenberg, Germany2-3

Large-Eddy Simulation of the Primary Breakup of a Spatially Developing Liquid Film

M. Klein, J. Janicka

Department of Mechanical Engineering, Technical University of Darmstadt, Germany.....2-4

A Statistical Model For The Evaporation Of Real-Fuel Drops For Use In Many-Drop Simulations

K. G. Harstad¹, P. C. Le Clercq², J. Bellan^{1,2}

1. Jet Propulsion Laboratory

2. California Institute of Technology2-5

Eulerian Simulation of Coaxial Injection Using an Interfacial Surface Density Balance Equation

S. Jay¹, F. Lacas², S. Candel³

1. Institut Francais du Petrole, France

2. Laboratoire E.M2.C., C.N.R.S. UPR 288, Ecole Centrale Paris, France

3. Laboratoire E.M2.C.-C.N.R.S. and Institut Universitaire de France, Paris, France2-6

Development and Applications of a Level Set Method for Interface Tracking

S. Tanguy, A. Berlemont

UMR6614-CORIA, Technopôle du Madrillet, France2-7

The Two Vortex Sheets Model in the Description of Jet Instabilities

M. Costa

Istituto Motori - CNR, Italy.....2-8

Numerical study of Strouhal Instabilities in Two-phase Flows

M. Burger¹, R. Schmehl², O. Schäfer¹, R. Koch¹, S. Wittig¹

1. Institut für Thermische Stromungsmaschinen, Univ Karlsruhe, Germany

2. Aereothermod. Section TOS-MPA, European Space & Technology Centre, The Netherlands2-9

Two-Fluid Modeling of the Near-Field of Full-Cone Sprays

V. Iyer¹, J. Abraham²

1. GE Corporate Research and Development, New York, USA

2. M.J. Zucrow Labs, School of Mech. Eng., Purdue University, West Lafayette, USA.....2-10

Reconstructing Polydispersed Multi-Phase Flow Joint Probability Density Functions Using The Maximum Entropy Method

S. Scott, J. Shrimpton

Mechanical Engineering Department, Imperial College - London, UK.....2-11

A New Approach for the Application of the Maximum Entropy Formalism on Sprays

J. Cousin, Ph. Desjonquères

Université et INSA de Rouen, France.....2-12

Analysis of Double-Peak Spray Drop-Size Distribution from the Application of the Maximum Entropy Formalism

K. Triballier, C. Dumouchel, J. Cousin

Université et INSA de Rouen, France.....2-13

Mathematical and Numerical Analysis of Droplet Surface Temperatures Using the Droplet Size Moment Theory

S.M. Hernandez-Gonzalez, A.P. Watkins

Department of Mechanical, Aerospace and Manufacturing Engineering UMIST Manchester, UK2-14

Spray Characteristics from Truncated Lévy Statistics

N. Rimbert, O. Séro-Guillaume

LEMTA, INPL-UHP-CNRS, France.....2-15

Second Order Spatial Accuracy in Spray Calculations

S. Are¹, S. Hou², D.P. Schmidt²

1. Dept. of Mathematics and Statistics, Univ. of Massachusetts, USA

2. Dept. of Mechanical and industrial Engineering, Univ. of Massachusetts, USA2-16

A CFD Code For Diesel Direct Injection Simulation

R. Marcer

PRINCIPIA R.D., La Ciotat – France..... 2-17

Scrutinizing Evaporation Models for Computational Modelling of Turbulent Sprays

D. Kolaitis, M. Founti

Mechanical Engineering Department, National Technical University of Athens, Greece2-18

Modelling Droplet Breakup in Complex Two-Phase Flows

R. Schmehl

Aerothermodynamics Section TOS-MPA, European Space & Technology Centre, ESA.....2-19

Analysis of Existing Spray Penetration Models for Prediction of DME Spray

S-C. Kim, J-S. Hwang, S-Y. No

Dept. of Agricultural Machinery Engineering, Chungbuk University, Korea2-20

Numerical Studies of Droplet Interactions

A. Wadhwa, V. Magi, J. Abraham

M.J. Zucrow Labs, School of Mechanical Engineering, Purdue University, USA.....2-21

Determination of the CFD Input Parameters for a MWF Spray

P. Geier, H. Kim, M-C. Lai, X. Xie

Wayne State University, Detroit, Michigan, USA2-22

An Evaluation of Three Atomization Models for Dense Sprays

N.B.H. Abdelkarim¹, A.R. Masri², S.S. Ibrahim¹, G. Wigley¹

1. Department of Aeronautical and Automotive Engineering, Loughborough University, UK

2. School of Aerospace, Mechanical and Mechatronic Engineering, The University of Sydney, Australia2-23

Impingement of a Droplet onto a Solid Wall - A Numerical Investigation

N. Nikolopoulos, G. Bergeles

Dept. Of Mechanical Engineering, National Technical University of Athens, Greece2-24

Simulation of Liquid Jet Breakup by the Level Set Method

Y. Pan, K. Suga

Toyota Central R & D Labs., Inc., Japan.....2-25

3. Liquid Atomisers and Spray Systems

Spray Formation from Wall Impingement-Type Atomizer

T. Inamura¹, M. Daikoku²

1. Faculty of Science and Technology, Hirosaki University, Japan

2. Department of Mechanical Systems on Information Technology, Hachinohe Institute of technology, Japan3-1

Effect of Wall Impingement on the Atomization Characteristics of an Air-Blasting Nozzle for Jet Engines

S.Shiga¹, Y. Matsumoto¹, M. Araki¹, S. Hayashi², H. Yamada², H. Nakamura³, T. Ishima³, T. Obokata³

1. Department of Mechanical System Engineering, Gunma University, Japan

2. National Aerospace Laboratory, Tokyo, Japan

3. Department of Mechanical Engineering, Gunma University, Japan3-2

Influence of the Internal Flow Conditions of Slit Nozzles on the Stability of Liquid Sheets: Experimental Results

J. Scholz, K. Roetmann, V. Beushausen

Laser-Laboratorium Goettingen e.V., Goettingen, Germany3-3

Characterisation of a Spray Produced by Sharp-Edged Orifices in the Second-Wind Jet Breakup Regime

A. Maragkos, V. Cleary, P.J. Bowen

Division of Mechanical Engineering and Energy Studies, Cardiff University, UK3-4

Atomization of a Small-Diameter Liquid Jet by a High-Speed Gas Stream

C.M. Varga¹, J.C. Lasheras¹, E.J. Hopfinger²

1. Department of Mechanical and Aerospace Engineering, Univ. of California, San Diego, USA

2. LEGI-CNRS/UJF/INPG, France3-5

Development of Drop Size Distribution Control Technique

K. Terashima, D. Shinohara, M. Nakagawa, N. Tokuoka

Graduate School of Science & Technology, KEIO University, Japan3-6

Atomization Enhancement of the Spray and Improvement of the Spray Characteristics by Cavitation and Pin Inserted in the Nozzle Hole

N. Tamaki, M. Shimizu, H. Hiroyasu

Kinki University, Japan3-7

Experimental Investigation of the Primary Breakup Zone of High Pressure Diesel Sprays from Multi-Orifice Nozzles

C. Schugger, U. Renz

Lehrstuhl für Wärmeübertragung und Klimatechnik, RWTH Aachen, Germany3-8

Design of an Air-Mist Atomizer for Surface Cooling Purpose

L. Bendig¹, S. Schürmann¹, M. Raudensky²

1. Lechler GmbH, Metzingen, Germany

2. Brno University of Technology, Czech Republic3-9

Discharge Coefficient and Operational Flow Characteristics of Multihole Effervescent Atomizer

J. Jedelsky¹, M. Jicha¹, J. Slama²

1. Brno University of Technology, Faculty of Mechanical Engineering, Brno, Czech Republic

2. First Brno Works, Trebic, Czech Republic3-10

Characterization of Spray Generated by Multihole Effervescent Atomizer and Comparison with Standard Y-jet Atomizer

J. Jedelsky¹, M. Jicha¹, J. Slama²

1. Brno University of Technology, Faculty of Mechanical Engineering, Brno, Czech Republic

2. First Brno Works, Trebic, Czech Republic3-11

In-situ Characterisation of a Nanoparticle Jet*R. Lindner¹, M. Dieckmann¹, M. Türk²*

1. European Space Agency, Research and Technology Centre, The Netherlands

2. Institut für Technische Thermodynamik und Kältetechnik, Universität Karlsruhe, Germany.....3-12

Development of Effervescent Atomisers for Oil-Fired Power Stations*F. Morelli¹, S. Ligasacchi¹, M. Bizzarri²*

1. Enel Produzione-Ricerca Pisa, Italy

2. Euroflam trainee at Enel Produzione-Ricerca Pisa, Italy.....3-13

4. Agricultural Sprays**Characterization of a Variable Charge Induction Nozzle for Agricultural Application***G.N. Laryea, S.Y. No*

Dept. of Agricultural Machinery Engineering, Chungbuk National University, Korea.....4-1

Depositional Studies of a Charged Spray Application in an Orchard*G. N. Laryea, S. C. Kim, S. Y. No*

Dept. of Agricultural Machinery Engineering, Chungbuk National University, Korea.....4-2

Rotary atomizer Droplet Size Distribution Database for Forestry Applications*M.E. Teske¹, H.W. Thistle², A.J. Hewitt³, J.H. Ghent⁴*

1. Continuum Dynamics, Inc., USA

2. USDA Forest Service, Morgantown, WV, USA

3. Stewart Agricultural Research Services Inc., USA

4. USDA Forest Service, Asheville, NC, USA4-3

5. Electro Sprays**Electrohydrodynamic Induced Wave-Collision on a Liquid Jet***A. Speranza¹, M. Ghadiri²*

1. Istituto di Biostrutture e Bioimmagini - CNR, Napoli, Italy

2. Department of Chemical Engineering, University of Leeds, UK.....5-1

On the EHD Atomization Mechanism*V. Kogan*

Battelle Memorial Institute, USA5-2

Experimental Study in the Structure of Water Electrolyte Sprays and Drops under the Electrical Field*Gak E. Z.*

Agrophysical Institute, Laboratory of Electromagnetic Hydrophysics, Russia5-3

The Electrostatic Spray Painting Process with High-Speed Rotary Bell Atomizers: Influences of Operating Conditions and Target Geometries*J. Domnick, A. Scheibe, Q. Ye*

Fraunhofer-Institute for Manufacturing Engineering and Automation, Germany.....5-4

“Hissing” Electropray and Combustion at the Mesoscale*S.A. Kaiser, D.C. Kyritsis, M.B. Long, A. Gomez*

Yale Center for Combustion Studies - Dept. of Mechanical Engineering, Yale University, USA.....5-5

Mixed Convection Drag Force on a Small Particle*E. Mograbi¹, A. Vikhansky², E. Bar-Ziv^{1,2}*

1. Department of Mechanical Engineering, Ben-Gurion University of the Negev, Israel

2. Department of Environmental Engineering, Ben-Gurion University of the Negev, Israel5-6

Electrohydrodynamic Atomization of n-Heptane in a Needle-to-Plate System*R. Ragucci¹, A. Bellofiore², A. Cavaliere²*

1. Istituto di Ricerche sulla Combustione - C.N.R., Napoli, Italy

2. Dip. Ingegneria Chimica - Università degli Studi di Napoli Federico II, Italy5-7

Dynamics of Electrically Charged Evaporating Sprays*Y. Laoonual, N.E.Stevens, J.S. Shrimpton*

Department of Mechanical Engineering, Imperial College - London, UK5-8

Electrospraying Drying and Deposition of Nanomaterial - Analysis by Atomic Force Microscopy*Sgro L.A., Barone A.C., D'Alessio A.*

Dipartimento di Ingegneria Chimica, Università degli Studi "Federico II" di Napoli, Italy5-9

6. Medical Aerosols**Deposition of Charged Aerosol in Reconstructed Human Airways***D. Koolpiruck, S. Prakoonwit, and W. Balachandran*

Department of systems engineering, Brunel University, UK6-1

Droplet Dynamics, Fluid Flow and Particle Deposition for Pulmonary Drug Delivery to Pediatric Patients*T. Gemci¹, G. Allen¹, B. Shortall¹, T. Corcoran², N. Chigier¹*

1. Spray Systems Technology Center, Carnegie Mellon University, Pittsburgh, U.S.A.

2. UPMC Montefiore, Pittsburgh, U.S.A.6-2

A Rational Encapsulation Process by Use of an Annular Liquid Jet*S.P. Lin*

Department of Mechanical and Aeronautical Engineering, Clarkson University, USA6-3

7. Spray Combustion**Numerical Simulation of the Ignition of a Single Fuel Droplet in an Air with Finite Volume***O. Moriue, S. Schnaubelt, C. Eigenbrod, H.J. Rath*

ZARM, Univeristy of Bremen, Germany7-1

Development of Partially-Premixed Spray Burner and Observation of Flame Structure*I. Kawasumi, H. Nomura, Y. Ujiie*

College of Industrial Technology, Nihon University, Japan7-2

An Experimental Study on a Multiple-Orifice Twin-Fluid Atomizing Nozzle for NO_x Reduction*J.W. Park¹, H.B. Choi¹, H.J. Kim², C.W. Lee¹, S.K. See³*

1. Department of Mechanical Engineering, Kyungpook National University, Korea

2. Korea Institute of Energy Research, Korea

3. Research Institute of Industrial Science & Technology, Korea.....7-3

Measurement of the Power Spectral Density of the Fuel Spray in an Acoustically-Active Combustor*C.M.Sipperley, C.F.Edwards*

Dept. of Mechanical Engineering - Stanford Univ., USA7-4

Prediction of the Mean Diameter of Particle-Cluster Fractal Soot Aggregates Formed Inside Envelope Droplet Flames*G. Ben-Dor, T. Elperin, B. Krasovtsov*

Department of Mechanical Engineering Ben-Gurion University, Israel.....7-5

Investigation of Spray Detonation Characteristics Using a Controlled, Homogeneously Seeded Two-Phase Mixture*B. M. Knappe, C. F. Edwards*

Department of Mechanical Engineering, Stanford University, USA7-6

Investigation of Burning Sprays Applying GSI Out-of-Focus Technique*R. Calabria, A. Casaburi, P. Massoli*

Istituto Motori - CNR, Napoli, Italy7-7

8. Spray Deposition / Drop Wall Interaction**Feasibility of Improving the Atomization Characteristics with Wall Impingement for Steady Jet***M. Araki¹, C. Xu¹, S. Shiga¹, S. Hayashi², H. Yamada², H. Nakamura³, T. Ishima³, T. Obokata³*

1. Department of Mechanical System Engineering, Gunma University, Japan

2. National Aerospace Laboratory, Tokyo, Japan

3. Department of Mechanical Engineering, Gunma University, Japan8-1

Collisions of Single and Multiple Drops onto Solid Walls*D. Vadillo¹, E. Canot², B. Lopez³, A. Soucemarianadin¹*

1. Laboratoire des Ecoulements Géophysiques et Industriels (LEGI) Grenoble, France

2. IRISA, Rennes, France

3. Ardeje, Valence, France8-2

Impacts of Drops of Water and Polymeric Fluids on Small Targets*A. Rozhkov, B. Prunet-Foch, M. Vignes-Adler*

Laboratoire de Physique des Matériaux Divisés et des Interfaces, UMR8108 du CNRS, Université de

Marne-la-Vallée, France8-3

Improving Car Air Conditioning Systems by Direct Numerical Simulation of Droplet-Wall**Interaction Phenomena***F. Maichle¹, B. Weigand¹, K. Trackl², B. Wiesler³*

1. Institute of Aerospace Thermodynamics, University of Stuttgart, Germany

2. DaimlerChrysler AG, Germany

3. AVL List GmbH, AST, Austria8-4

Interaction of High Inertia Spreading Films*I. V. Roisman¹, B. Prunet-Foch², C. Tropea¹, M. Vignes-Adler²*

1. Technische Universität Darmstadt, Darmstadt, Germany

2. Université de Marne la Vallée, Marne la Vallée Cedex 2, France8-5

Influence of Surface Properties on the Dynamic Behaviour of Impacting Droplets*A.S. Moita, A.L.N. Moreira*

Instituto Superior Técnico, Department of Mechanical Engineering, Lisbon, Portugal8-6

Observation Method to Obtain Information on the Vapour Film during the Collision of Droplets with Hot Walls*N. Roth, T. Straub, B. Weigand*

Institute of Aerospace Thermodynamics, University of Stuttgart, Germany8-7

Simultaneous Measurements of Mean and Surface Temperature of Evaporating Moving Droplets using Combined Two Colors Laser-induced Fluorescence and Infrared Thermometry. Extension to Measurements of Temperature Distribution Inside the Droplets*G. Castanet¹, A. Delconte¹, P. Lavieille¹, F. Lemoine¹, C. Amiel², P. Berthoumieu², G. Lavergne²*

1. LEMTA - CNRS UMR 7563, France

2. ONERA/DMAE, France8-8

Development of a Spray Wall Impaction Model Based on Drop Size Moments*E. Lemini, A.P. Watkins*

Department of Mechanical, Aerospace & Manufacturing Engineering, UMIST, Manchester, UK8-9

Modelling of Spray Impingement Heat Transfer for Spray Cooling*J.C. Landero, A.P. Watkins*

Mechanical, Aerospace and Manufacturing Engineering Department, UMIST, UK8-10

Transient High Pressure Spray Cooling of Moving High Temperature Surfaces*G.G. Nasr¹, R.A. Sharief², S. Rho², A.J. Yule²*

1. School of Aeronautical, Civil and Mechanical Engineering, Univ. of Salford, Manchester, UK

2. Dept. of Mechanical, Aerospace and Manufacturing Engineering, UMIST, Manchester, UK.....8-11

Influence of Spray Impingement on Gas Surface Heat Transfer*M. Garbero¹, U. Fritsching¹, M. Vanni²*

1. Verfahrenstechnik, Universität Bremen, Germany

2. Dip. Scienza dei Materiali e Ingegneria Chimica, Politecnico di Torino, Italy8-12

Wall Impact of Single Droplets under Conditions of DISI-Engines*B. Richter, K. Dullenkopf, S. Wittig*

Institute for Thermal Turbomachinery, University of Karlsruhe, Germany8-13

Drop Impact on a Heated Wall – Influence of Ambient Pressure*J. Dewitte, P. Berthoumieu, G. Lavergne*

ONERA Centre de Toulouse, France.....8-14

Multiple Drop Impact on Heated Surface*G.E. Cossali, M. Marengo, M. Santini*

Dipartimento di Ingegneria, Università di Bergamo, Italy8-15

Spray/Wall Interaction in Direct Injection Spark Ignition Engines Equipped with Multi-Hole Injectors*E. Abo-Serie, M. Gavaises, C. Arcoumanis*

School of Engineering and Mathematical Sciences, City University.....8-16

Statistics of Spray Deposition and Drift for Inhomogeneous Suspensions*H.J. Holterman*

Institute of Agricultural and Environmental Engineering, Wageningen, the Netherlands8-17

Experimental Study on the Effect of a Strong Negative Pressure Gradient on a Shear-Driven Liquid Fuel Film*P. Schober, J. Ebner, O. Schäfer, S. Wittig*

Lehrstuhl und Institut für Thermische Strömungsmaschinen, Universität Karlsruhe, Germany8-18

Marangoni and Temperature Dependent Wetting Phenomena in Picoliter Size Solder Droplet Deposition*M. Dietzel, D. Poulikakos*

Institute of Energy Technology, Swiss Federal Institute of Technology, Switzerland.....8-19

Heat Transfer during Single Drop Impact onto a Wetted Surface*T. Gambaryan-Roisman¹, I. V. Roisman², P. Stephan¹, C. Tropea²*

1. Chair of Technical Thermodynamics Darmstadt University of Technology, Darmstadt, Germany

2. Chair of Fluid Mechanics and Aerodynamics Darmstadt University of Technology, Darmstadt, Germany8-20

9. Measurement Techniques**Mass Flux Imaging in Sprays***T. Berg, J. Deppe, T. Schucht, H. Voges*

LaVision GmbH Göttingen, Germany9-1

Global Rainbow Refractometry Development for Droplet Temperature Measurement in Hostile Environment*P. Lemaitre¹⁻², G. Grehan², E. Porcheron¹, P. Brun¹, J. Malet¹, P. Cornet¹, J. Vendel¹*

1. Institut de Radioprotection et de Sécurité Nucléaire, France

2. Laboratoire d'Electromagnétisme et Systèmes Particulaires, France9-2

Application of Fuel Tracers with Different Volatilities for Planar LIF/Mie Drop-Sizing in Evaporating Systems*I. Düwel, T. Kunzelmann, J. Schorr, C. Schulz, J. Wolfrum*

Physikalisch-Chemisches Institut, Universität Heidelberg, Germany.....9-3

Optical Patternation of a Multi-hole Fuel Spray Nozzle*J. Lim¹, Y. Sivathanu¹, P.E. Sojka²*

1. En'Urga Inc., USA

2. School of Mechanical Engineering, Purdue University, USA.....9-4

Simultaneous Measurements of Droplet Temperature and Size Histograms using Combined Two Colors Laser-induced Fluorescence and PDA*A. Delconte¹, P. Lavieille¹, D. Blondel², M. Lebouché¹, F. Lemoine¹*

1. LEMTA - UMR 7563, France

2. DANTEC Dynamics, Denmark9-5

Measurement of Droplet Size and Velocity Distributions in Sprays Using Interferometric Particle Imaging (IPI) and Particle Tracking Velocimetry (PTV)*J. Madsen¹, J. Harbo¹, T.I. Nonn², D. Blondel², B.H. Hjertager¹, T. Solberg¹*

1. Aalborg University Esbjerg, Denmark

2. Dantec Dynamics, Denmark9-6

Behavior of the Spraytec in the Presence of Multiple Light Scattering and of Bimodal Drop-Size Distribution*K. Triballier, J. Cousin, C. Dumouchel*

Université et INSA de Rouen, France.....9-7

Assessment of Multiple Scattering Errors of Laser Diffraction Instruments*P.A. Strakey*

Air Force Research Laboratory - AFRL/PRSA, USA9-8

Measurements of Three-dimensional Velocities of Spray Droplets using the Holographic Velocimetry System*Y.J. Choo¹, B.S. Kang²*

1. Chonnam National University, Korea

2. Department of Mechanical Engineering -Chonnam National University, Korea9-9

Experimental Study of Gasoline Direct Injection Spray using Quantitative Laser Induced Fluorescence in a Firing SI Engine*B. Jeanne¹, L. Robin², E. Bourguignon¹, M. Trinité³*

1. PSA Peugeot Citroën, Vélizy Villacoublay, France

2. CERTAM, Rouen, France

3. UMR 6614 CORIA, Rouen, France.....9-10

Global Rainbow Thermometry in a Liquid-Liquid Suspension*M.R. Vetrano, J.P.A.J. van Beeck*

Von Karman Institute for Fluid Dynamics, Rhode Saint Genèse, Belgium.....9-11

10. Emerging Diagnostics**Laser Doppler Based Particle Characterization With Backscattered Light***N. Damaschke, H. Nobach, N. Semidetnov, C. Tropea*

Chair of Fluid Mechanics and Aerodynamics, Darmstadt University of Technology, Germany10-1

Diagnostics of Sprays with Wide Droplet-Size Distribution by Novel Interferometric Laser Imaging Technique*T. Kawaguchi¹, K. Matsuura², K. Ueyama², M. Maeda¹*

1. Keio University, Hiyoshi 3-14-1, Kohoku-ku, Yokohama, Japan

2. KANOMAX Japan Incorporated, Japan.....10-2

A Sensor Based Technique for Multi-Phase Spray Analysis at High Loads*F. Landwehr, H. Wiggers, P. Walzel*

Mechanische Verfahrenstechnik, Chemietechnik, Universität Dortmund, Germany.....10-3

Laser Scattering Patternator: a Novel Technique for the Measurement of Industrial, Optically Dense Sprays*B. Lazaro¹, D. Peinado², M. Vega², A. Lecuona², P. Rodriguez², A. Jasuja³, F. Liousse⁴*

1. Universidad Politecnica de Madrid/E.T.S.I. Aeronauticos, Spain

2. Universidad Carlos III, Leganes, Spain

3. Cranfield University, UK

4. ONERA-CERT, Toulouse, France10-4

Geometry Optimisation of a Pneumatic Extension Nozzle for Sample Introduction in Atomic Emission Spectrometry (AES)*S. Groom, P. Walzel*

Dept. of Chemical process Engineering, University of Dortmund, Germany.....10-5

Improved GSI Out-of-Focus Technique for Application to Dense Sprays and PIV Measurements*R. Calabria and P. Massoli*

Istituto Motori - CNR, Via Marconi 8, 80125 Napoli, Italy10-6

11. Turbine Sprays**Development of a System for Monitoring of Thermo-Acoustic Instabilities in Liquid Premixed Burner for Gas Turbines***R. Bruschi¹, C. Stringola¹, S. Giammartini¹, F. DiCarlo¹, F. Pittaluga², M. Caruggi²*

1. ENEA - C.R. Casaccia, Rome, Italy

2. DIMSET, University of Genova, Italy.....11-1

Modelling Oil Droplet/Film Interaction in an Aero-Engine Bearing Chamber*M. Farrall, S. Hibberd, K. Simmons*

The University of Nottingham Technology Centre in Gas Turbine Transmission Systems, UK11-2

Characterization of the Reacting Two-Phase Flow Inside a Research Ramjet Combustor*A. Ristori, G. Heid, C. Brossard, A. Bresson*

ONERA, France.....11-3

Spray and Combustion Characteristics of a Dump-type Ramjet Combustor*H.J. Youn, C.W. Lee, S.Y. Moon, S. Krishnan*

Department of Mechanical Engineering, Kyungpook National University, South Korea11-4

Pilot Fuel Injection Optimisation in an Annular Combustor*P. Di Martino, G. Cinque, A. Terlizzi*

Fiat Avio Naples, Italy11-5

12. Internal Flows**Flow Field and Phase Distribution inside Effervescent Atomizers***M. Loercher¹, F. Schmidt², D. Mewes²*

1. Bayer AG, BTS-ENG-CP-ACSC, Krefeld, Germany

2. Institute of Process Engineering (IfV), University of Hannover, Germany.....12-1

Coupled Calculation of Cavitating Nozzle Flow, Primary Diesel Fuel Break-Up and Spray Formation with an Eulerian Multi-Fluid-Model*E. von Berg¹, W. Edelbauer¹, A. Alajbegovic², R. Tatschl¹*

1. AVL List GmbH, Graz, Austria

2. AVL Powertrain Engineering Inc., USA.....12-2

Simulation of Cavitating Flow in High Pressure Gasoline Injectors*D. Greif¹, B. Monteverde², A. Alajbegovic³*

1. AVL AST d.o.o., Partizanska 13a, 2000 Maribor, Slovenia

2. Magneti Marelli, Bologna, Italy

3. AVL Powertrain Engineering Inc., 47519 Halyard Drive, Plymouth, USA.....12-3

CAVIF: A 3D Code for the Modelling of Cavitating Flows in Diesel Injectors*C. Habchi¹, N. Dumont¹, O. Simonin²*

1. Institut Français du Pétrole, France

2. Institut de Mécanique des Fluides de Toulouse, France12-4

Experimental Investigation on Structure of Cavitating Flow and Velocity Field inside a 2-D Hole**Nozzle***T. Oda, Y. Yasuda*

Department of Mechanical Engineering, Tottori University, Japan.....12-5

Cavitation in a Transparent Real Size VCO Injection Nozzle*R. Miranda, H. Chaves, U. Martin, F. Obermeier*

Institut für Mechanik und Fluidodynamik, TU Bergakademie Freiberg, Germany.....12-6

Effect of Cavitation in the Cylindrical Nozzle on the Liquid Breakup Process*M. Daikoku¹, H. Furudate¹, S. Tanno², T. Inamura³*

1. Department of Mechanical Engineering, Hachinohe Institute of Technology, Japan

2. Environmental Conservation Center, Tohoku University, Japan

3. Department of Electronic and Information System Engineering, Hirosaki University, Japan.....12-7

The Analogy Between Swirl Atomizer and Weir Flow: The Principle of Maximum Flow*J.J. Chinn*

Dept. of Mechanical, Aerospace and Manufacturing Engineering, UMIST, Manchester, UK.....12-8

Phenomenological Study of the Pressure Swirl Atomizer Internal Flow*D. Donjat¹, J.L. Estivalezes², M. Michau¹, G. Lavergne²*

1. HISPANO SUIZA, -Centre de Réau, France

2. ONERA, Centre de Toulouse, DMAE, France12-9

13. Fluid Mechanics / Heat and Mass Transfer / Multiphase Transport**Simulation of Spray Formation Using Secondary Atomization and Turbulent Vaporization Models***E. Bodèle¹, P. Pillot¹, I. Gökalp¹, S. Zurbach², D. Saucereau²*

1. Centre National de la Recherche Scientifique, Orléans, France

2. SNECMA Moteurs Groupe SNECMA, Vernon, France13-1

A Rectilinear Droplet Stream Study: Influence of Lateral Interaction on Droplet Thermal and Dynamical Behavior*A. Atthasit, Y. Biscos, G. Lavergne*

ONERA-DMAE, Centre de Toulouse, France13-2

Spray Quality at Elevated Gas Densities*H. Lienemann and J.S. Shrimpton*

Imperial College - London, UK13-3

LES of the Particle-laden Turbulent Channel Flow Using Partially Smoothed Dynamics of Particles*A. Chtab, M. Gorokhovski*

CORIA UMR 6614 CNRS University of Rouen, Site Universitaire du Madrillet, France13-4

Two-Fluid Heat Transfer from Single or Multiple Droplets Using a One Field VOF Model*V. Mehdi-Nejad, J. Mostaghimi, S. Chandra*

Department of Mechanical & Industrial Engineering, University of Toronto, Canada.....13-5

Studies on the Effect of Air Temperature on Lean Premixed Prevaporised Turbulent Sprays*C. Pichard, C. Chauveau, I. Gökalp*

Lab. de Combustion et Systèmes Réactifs, CNRS, Orléans, France13-6

Influence of Composition and Ambient Temperature on the Evaporation Rate of Binary Mixture Droplets

J. Wilms¹, S. Arndt², B. Weigand¹

1. Institute of Aerospace Thermodynamics, University of Stuttgart, Germany
2. Robert Bosch GmbH, Germany 13-7

Concentration Fields in Evaporating Droplets

G. Brenn

- Graz University of Technology, Institute of Fluid Mechanics and Heat Transfer, Austria..... 13-8

Computations and Experiments on the Evaporation of Multi-Component Droplets

G. Brenn¹, L.J. Deviprasath², F. Durst²

1. Graz University of Technology, Institute of Fluid Mechanics and Heat Transfer, Austria
2. University of Erlangen-Nürnberg, Germany 13-9

Effects of Suspender Diameter and Natural Convection on Measured Evaporation Constant of a Fuel Droplet

H.Nomura, H.Hirai, Y.Ujiie

- Department of Mechanical Engineering . Nihon University, Japan 13-10

The Sub- and Supercritical Behavior of Fuel Droplets

Y.D. Yeboah¹, E.K. Karikari¹, Z. Wang¹, J. Tishkoff²

1. Department of Engineering, Clark Atlanta University, USA
2. Air Force Office of Scientific Research, Directorate of Aerospace and Materials Science, USA..... 13-11

The Analogy Between Waves on the Surface of the Air-core of a Swirl Atomizer and Long, Shallow Water, Gravity Waves

J.J. Chinn

- Department of Mechanical, Aerospace and Manufacturing Engineering. UMIST, UK..... 13-12

Modelling of a Diesel Oil Spray at Different Swirl Numbers and Comburent Temperature in Mild Combustion Conditions

G. Langella, C. Mongiello, C. Noviello

- Mechanical Engineering and Energetics Department, University of Naples "Federico II", Italy 13-13

Drag On Ellipsoids At Finite Reynolds Number

B.J.O'Donnell, B.T.Helenbrook

- MAE - Clarkson Univ. Potsdam, USA 13-14

Behaviour of Fuel Droplet Evaporation Injected in a Thermal Convective Counter Flow

A. Amoresano¹, C. Allouis²

1. Dip. di Ing. Meccanica per l'Energetica - Univ. di Napoli "Federico II", Italy
2. Istituto di Ricerche sulla Combustione - CNR, Italy 13-15

14. Engine Sprays

An Investigation of the Breakup Mechanisms for Swirl Sprays from High-Pressure Swirl Injectors

C.A. Chryssakis¹, D.N. Assanis¹, J. Lee², K. Nishida²

1. University of Michigan, MI, U.S.A.
2. University of Hiroshima, JAPAN 14-1

In-Cylinder Study of the Formation, Autoignition and Soot Production of Diesel Sprays at Elevated Pressures

C. Crua, J.C. Evans, D.A. Kennaird, M.R. Heikal

- Internal Combustion Engine Group, School of Engineering, University of Brighton, UK..... 14-2

Effect of Injection Parameters and Injection System on Spray Characteristics for HSDI Diesel Engines

E.M. El-Hannouny, P.V. Farrell

- Engine Research Center, Department of Mechanical Engineering, University of Wisconsin-Madison, USA 14-3

Penetration and Scale Law for a GDI Swirled Spray and its Surrounding Air Pattern*L. Araneo*

Dipartimento di Energetica, Politecnico di Milano, Italy 14-4

Flow and Mixture Formation of a Fuel Spray Impinging on a Wall - Experimental Studies and Numerical Simulation*T. Schittkowski, S. Hildenbrand, S. Staudacher, D. Brüggemann*

Lehrstuhl für Technische Thermodynamik und Transportprozesse, Univ. Bayreuth, Germany..... 14-5

Characteristics of a Gasoline Spray Reflected from a Wall after Impingement*R. Lindgren, I. Denbratt*

Dept. of Thermo and Fluid Dynamics, Chalmers Univ. of Technology, Gothenburg, Sweden..... 14-6

Comparison of Spray Simulation and Measurement for a Multi-Hole Injector with and without Wall Impingement*Kuhnke, D.*

Dept. of Applied Physics - Corporate Research and development - Robert Bosch GmbH, Stuttgart, Germany..... 14-7

Experimental and Numerical Studies on Multicomponent Fuel Spray and Vaporization Processes*J. Senda¹, D. Kawano², Y. Wada¹, H. Fujimoto¹*

1. Doshisha University, Japan

2. National Traffic Safety and Environment Laboratory, Japan..... 14-8

Basic Flow Processes in High Pressure Fuel Injection Equipment*E. Winklhofer¹, E. Kelz², A. Morozov²*

1. AVL List GmbH, Graz, Austria

2. University of Technology, Graz, Austria 14-9

Effect of Internal Flow in a Simulated Diesel Nozzle on Spray Characteristics*H. Gen Fujimoto¹, K. Tanaka², H. Kuzuwata¹, J. Senda¹*

1. Dept. of Mech. Eng, Doshisha University, Japan

2. Matsushita Electric Industrial Co., Japan 14-10

Morphological Analysis of the Diesel Jet at the Nozzle Outlet*J. Yon, J.B. Blaisot*

CORIA-UMR 6614 : CNRS, Université et INSA de Rouen, France..... 14-11

Spray Evolution in Small Bore D.I. Diesel Engines with Different Injection Strategies*C. Beatrice, P. Belardini, C. Bertoli, N. Del Giacomo, M. Migliaccio*

Istituto Motori, C.N.R., Napoli, Italy..... 14-12

Measurement and Calculation of Diesel Spray Penetration*H. Hiroyasu, H. Miao*

Research Institute of Industrial Technology, Kinki University, Japan..... 14-13

Experimental and Numerical Investigation of the Aerodynamic Break-up of Liquid Droplets at Diesel Engine Conditions*L. Reichelt, U. Renz*

Institute of Heat Transfer and Air Conditioning, Aachen University, Germany 14-14

Experimental and Numerical Analysis of Sprays from a CR Diesel Injector*L. Allocca¹, A. De Vita², P. Rosa²*

1. Istituto Motori - CNR, Italy

2. Dipartimento di Energetica, Università dell'Aquila, Italy..... 14-15

Vapor Phase Imaging of Diesel Fuel Sprays from a Common Rail Injector*P.V. Farrell, M.S. Beckman*

Engine Research Center, Dept. of Mech. Eng., University of Wisconsin-Madison, USA..... 14-16

LDV Measurement of Spray of Diesel Fuel Containing Dissolved Gas*Q. Xinqi¹, H. Zhen¹, Y. Cunxian¹, L. Jianjiang¹, C. Hongyan²*

1. Research Institute of Internal Combustion Engine, School of Mechanical and Power Engineering, Shanghai Jiaotong University, P.R.China

2. Teaching and Research Section, Bengbu Institute of Automobile Management, Anhui, P.R.China 14-17

Spatially Resolved Determination of Fuel/Air Ratio Inside a Direct Injection SI-Engine Under Real Fuel Conditions

V. Beushausen¹, T. Mueller¹, O. Thiele¹, T. Wesker¹, R. Grzeszik², J. Raimann², S. Arndt²

1. Laser-Laboratorium Goettingen, Germany

2. Robert Bosch GmbH, Stuttgart, Germany 14-18

Microscopic Observation of Primary Spray Structure of High-Pressure Swirl Injector for Gasoline Direct Injection Engine

N. Kawahara¹, E. Tomita¹, T. Nakayama¹, M. Sumida²

1. Graduate School of Okayama University, Japan

2. Mitsubishi Electric Corp., Japan 14-19

Analyses of Pre-Swirl Spray Formation and its BreakUp Processes of D.I. Gasoline Spray

J. Lee, K. Nishida

Department of Mechanical System Engineering, University of Hiroshima, Japan 14-20

Impingement Studies for G-DI Sprays at Elevated Temperatures

P. Kay¹, D.W. Morris¹, P.J. Bowen¹, M.R. Gold², S.M. Sapsford²

1. Division of Mechanical Engineering, Cardiff University, UK

2. Ricardo Consulting Engineers, Bridge Works, UK 14-21

Spray and Mixture Formation Processes by High-Pressure Swirl Injector for DISI Engines - Analyses Based on Laser Absorption Scattering (LAS) Measurements

T. Li¹, M. Yamakawa², K. Nishida³, D. Takaki³, Y. Zhang³, H. Hiroyasu¹

1. Graduate School of Industrial Technology, Kinki University, Japan

2. Mazda Motor Corporation, Japan

3. Department of Mechanical System Engineering, University of Hiroshima, Japan 14-22

Near-Nozzle LDA/PDA Measurements of a GDI Spray and Their Analysis to Quantify Liquid Breakup and Atomization Mechanisms

G. Wigley¹, M. Goodwin¹, G. Pitcher², D. Blondell³

1. Aeronautical & Automotive Engineering Department, Loughborough University, UK

2. Lotus Engineering, Norwich, UK

3. Dantec Dynamics, Skovlunde, Denmark 14-23

Far-field Penetration of Mushroom-like Sprays

I.V. Roisman, C. Tropea

Technical University of Darmstadt, Germany 14-24

Atomization Characteristics of Multi-Hole Swirl Injectors for Direct Injection Engines - Observation of Spray Behavior and Calculation of Injector Internal Flow -

K. Nishida¹, H. Miao², M. Kawamoto³

1. Department of Mechanical System Engineering, University of Hiroshima, Japan

2. Kinki University, Japan

3. Nissan Motor Co., Ltd., Japan 14-25

Study on Ignitability of Fuel Spray

J. Hayashi, K. Terashima, S. Edagawa, N. Tokuoka

Graduate School of Science & Technology, KEIO University, Japan 14-26

Development and Use of an Atomisation Model for Transient Evaporative Diesel Sprays

C. Méndez, B. Giménez, F. Castro

Dpto. Ingeniería Energética y Fluidomecánica E. T. S. Ingenieros Industriales Univ. de Valladolid 14-27

Impact of the Gas Nozzle Arrangement on the Flow Field of a Twin Fluid Atomizer with External Mixing

H. Lohner, C. Czisch, U. Fritsching

Dept. of Chemical Engineering, University of Bremen, Germany 14-28

An Analysis on the Suitable Injection Pressure of Diesel Injection with high Pressure

D. Y. Jeong¹, S. J. Park¹, J. T. Lee²

1. Department of Mechanical Engineering Graduated School Sungkyunkwan University Suwon, Korea

2. Department of Mechanical Engineering Sungkyunkwan University, Korea 14-29

External Structure of an Effervescent Diesel Fuel Injector-Produced Spray*Z. Liu, P.E. Sojka, J.P. Gore*

Maurice J. Zucrow Laboratories, School of Mechanical Engineering, Purdue University, USA..... 14-30

Liquid Fuel Footprints on Combustion Chamber Wall in Port Fuel Injection Engine during Starting*H. Kim¹, S. Yoon¹, M-C.Lai¹, S. Quelhas², R. Boyd², Y-H. Yoo²*

1. Wayne State University, Detroit, Michigan, USA

2. Chonbuk National University, Korea 14-31

An Experimental Study on the Effect of Swirl and Injection Condition on D.I. Diesel Combustion Using a Transparent Engine System*K.H. Lee¹, C.S. Lee¹, H.S. Nam², H.Y. Jeong²*

1. Hanyang University, Seoul, Korea

2. Hanyang University graduated school, Korea..... 14-32

Diesel Spray Behavior with 3-Dimensional Micro-Nozzles*P. Prashanth Ravi¹, J. Blanchard², M. Corradini¹*

1. Engine Research Center, University of Wisconsin-Madison, USA

2. Dept. of Engineering Physics, University of Wisconsin-Madison, USA..... 14-33

Fluid Dynamics Investigation of a Fuel Spray for SIDI Engines by Particle Image Velocimetry*M. Auriemma¹, G. Caputo¹, G. Valentino¹, J. Zarinchang²*

1. Istituto Motori, CNR, Napoli, Italy

2. University of Shiraz, Iran 14-34

15. Environmental Applications**Spray Characterization for Coal Mine Dust Removal***T. Gemci¹, N. Chigier¹, J.A. Organiscak²*

1. Spray Systems Technology Center, Mechanical Engineering Dept. Carnegie Mellon University, U.S.A.

2. National Institute for Occupational Safety and Health, Pittsburgh Research Laboratory, U.S.A.....15-1

An Enhanced Nozzle Alignment to Cause Spray Overlapping in FGD Plants*M. Feldkamp, R. Kaesemann, J. Neumann, H. Fahlenkamp*

Chemical Engineering Department, University of Dortmund, Germany15-2

Characterisation of Mist Generation through Cloud Chamber Technology*A.P. Crayford, P.J. Bowen, A. Coughlin, S.I. Kwon, G. Tizzano, A.J. Griffiths*

Division of Mechanical Engineering, Cardiff University, UK15-3

Spray-Dry Desulfurization of Flue Gas from Heavy Oil Combustion*A. Lancia¹, R. Nigro¹, F. Scala², G. Volpicelli¹*

1. Dipartimento di Ingegneria Chimica, Università degli Studi "Federico II" di Napoli, Italy

2. Istituto di Ricerche sulla Combustione, CNR, Napoli, Italy.....15-4

16. Miscellaneous / Industrial**A Comparison on Spray Absorption Performance of LiNO₃-NH₃ and H₂O-NH₃ Systems***M. Venegas¹, M. Izquierdo², P. Rodríguez¹, A. Lecuona¹*

1. Departamento de Ingeniería Térmica y de Fluidos, Universidad Carlos III de Madrid, Spain

2. Instituto de Ciencias de la Construcción Eduardo Torroja (CSIC), Madrid, Spain.....16-1

Experimental Investigation of High Pressure Spray Drying Nozzle Performance at Industrial Operating Conditions

P. Menn, G. Schulte, K. Bauckhage

Department of Chemical Engineering, University of Bremen, Germany16-2

Simulation of Agglomeration in Spray Drying Installations: the EDECAD Project

R.E.M. Verdurmen, M. Verschueren, J. Straatsma, M. Gunsing

NIZO food research, Department of Processing, Quality and Safety, The Netherlands16-3

Lagrangian Modelling of Agglomeration During Spray Drying Processes

S. Blei, M. Sommerfeld

Department of Engineering Science, Martin Luther University Halle-Wittenberg, Germany16-4

Collision Dynamics of a Liquid Fire Suppressant upon a Heated Wax Surface

S.L. Manzello, J.C. Yang

Building and Fire Research Laboratory, National Institute of Standards and Technology, USA16-5

Thermal Characterization of a R134-A Two-Phase Flashing Jet

D. Yildiz, P. Rambaud, J. Van Beeck, J.M. Buchlin

Von Karman Institute for Fluid Dynamics, Belgium16-6

Basic Aspects of Interaction Between a High Velocity Diesel Jet and a Highly Porous Medium (PM)

M. Weclas¹, B. Ates², V. Vlachovic²

1. Head of Engine Research, Invent Invention of New Technologies GmbH, Am Wechselgarten 21, Germany

2. Development Engineer, Invent Invention of New Technologies GmbH, Am Wechselgarten 21, Germany16-7

The Mixing and Spray Structure of an Unlike-doublet Impinging Jet

W.H. Lai

Department of Aeronautics and Astronautics, National Cheng Kung University, Taiwan16-8

Evaluation of a Twin-fluid Atomizer for FCC Feeding System with Atomizing Medium Under Transonic Flow

E.J.J. Souza¹⁻², D.I. Vlassov², M.J.J. de S. Ponte²

1. Petrobras – SIX, Brazil

2. Federal University of Paraná, Brazil16-9

Fire Extinction by Water Spray

R. Yamashita, T. Kondo, S. Taniguchi, N. Tokuoka

Graduate School of Science & Technology, Keio University, Japan16-10

Computer Modelling of Isothermal Compression in the Reciprocating Compressor of a Complete Isoengine

P.L. Stephenson, M. Coney

Innogy plc., Swindon, UK16-11

Secondary Pneumatic Atomization at Sieves for High Liquid Flow Rates at Low Gas Pressures

P. Walzel, S. Groom, F. Landwehr

Dept. of Chemical Process Engineering, University of Dortmund, Germany16-12

Novel Developments in Actuator Designs For Flashing Household Aerosols

R.A. Sharief¹, A.J. Yule¹, K. Laidler²

1. UMIST Manchester, UK

2. Lionstar Corp Ltd, UK16-13

17. Spray Characterisation

Drop Sizes and Mass Fluxes Development in a Pressure Swirl Hollow Cone Spray

J.L. Santolaya, L.A. Aisa, J.A. García, I. García Palacín, E. Calvo

Zaragoza University, Spain 17-1

Recent Findings of Simultaneous Droplet Size, Shape and Velocity Detection of Injection Sprays in a High Pressure - High Temperature Cell

B. Ineichen

Swiss Federal Institute of Technology, Zurich, Switzerland 17-2

Properties of Sprays Created by an Ultrasonic Nozzle

S. Saengkaew¹, C. Moumain-Rousselle², S. Meunier-Guttin-Cluzel³, G. Boulnois³, L. Mèès³, H. Vanisri¹, G. Gréhan³

1. Particles and Technology Laboratory, Chulalongkorn University Bangkok, Thailand

2. LME, IPO-ESEM, Université d'Orléans, France

3. LESP/CNRS/Université et INSA de Rouen, France 17-3

Effects of Fuel Temperature on the Spray Characteristics of a Dual-orifice Type Swirl Injector

B.S. Park, H.Y. Kim, Y.C. Kim

Department of Mechanical Engineering, Korea University, Korea 17-4

Effect of Injection Rate Modulation on the Spatial Dispersion of Fuel Droplets and the Inner Structure of Fuel Spray Injected by a Hole Nozzle

A. Azetsu¹, M. Shikama²

1. Department of Mechanical Engineering, Tokai University, Japan

2. Tochigi R&D Center, Honda R&D Co.,Ltd., Japan 17-5

The Effect of the Cavitation in the Two-Dimensional Nozzle on Liquid Breakup Process

M. Daikoku¹, H. Furudate¹, H. Noda¹, T. Inamura²

1. Dept. of Mechanical Engineering, Hachinohe Institute of Technology, Japan

2. Department of Electronic and Information System Engineering, Hirosaki University, Japan 17-6

A Study on Oxygenated Fuel Spray Structure Using Laser-based Visualization and Particle Image Velocimetry

Z. Wu, Z. Huang, Z. Zhu

School of Mechanical Eng., Shanghai Jiaotong Univ., China 17-7

An Experimental Comparison of Evaporating and Non-evaporating Sprays in a Simple Turbulent Jet Flow

S.H. Starnner, A.R. Masri

School of Aerospace, Mechanical and Mechatronic Engineering, University of Sydney, Australia 17-8

Characterisation of Twin-Fluid Atomisation for Suspensions

B. Mulhem, U.Fritsching, G.Schulte, K.Bauckhage

Chemical Engineering Department, University of Bremen, Germany 17-9

The Influence of Atomizer Internal Geometry on the Drop Size Distribution of Pressure-Swirl Atomized non-Newtonian Liquids

S.R. Pidaparthi, P.E. Sojka

Maurice J. Zucrow Laboratories, School of Mechanical Engineering, Purdue University, USA 17-10

Experimental Study of the Spray of a Liquid-Liquid Coaxial Swirl Injector for Different Injection Pressures

K. Ghorbanian, M. Ashjaee, M. R. Soltani, M. H. Mesbahi, M. R. Morad

Sharif University of Technology, Tehran, Iran 17-11

Development Process of Shock Waves by Supersonic Spray

K-S. Im¹, M-C. Lai¹, J. Wang²

1. Dept. of Mech. Eng., Wayne State University, Detroit, Michigan, USA

2. Argonne National Laboratory, Illinois, USA 17-12

Fine Spray Abatement by Conventional and Complex Mesh Type Collectors*E. Brunazzi, A. Paglianti, S. Pintus, L. Tognotti*

Dept. of Chemical Engineering, University of Pisa, Italy..... 17-13

Detailed Analysis of Spray Structure and Air Entrainment in GDI Sprays Using a Tomographic Approach*C. Seibel¹, K. Gartung¹, S. Arndt¹, B. Weigand²*

1. Robert Bosch GmbH, Stuttgart, Germany

2. ITLR University of Stuttgart, Germany..... 17-14

Instantaneous Flow Rate Measurements For Strong Pulsated Flows*G. Delay¹, R. Bazile¹, E. Cid¹, G. Charnay¹, J. Boree², H.J. Nuglisch³*

1. Institut de Mécanique des Fluides de Toulouse, France

2. Laboratoire d'Etudes Aérodynamiques, Poitiers, France

3. SIEMENS Automotive-VDO Toulouse, France..... 17-15

18. Cryogenics and Aerospace**Disintegration of Fluids under Supercritical Conditions from Mixing Layer Studies***N. Okong'o¹, J. Bellan^{1,2}*

1. Jet Propulsion Laboratory, USA

2. California Institute of Technology, USA.....18-1

X-Ray Diagnostics Applied to High Pressure Cryogenic Sprays*B. Metay¹, E. Robert¹, R. Viladrosa¹, M. Dudemaine¹, C. Cachoncinlle¹, J.M. Pouvesle¹, W.O.H. Mayer², G. Schneider², I. Gökalp³*

1. GREMI, Université d'Orléans, France

2. DLR, German Aerospace Center, Lampoldshause, Germany

3. LCSR, EPEE, Orleans, France.....18-2

Flash-Evaporation of Oxidizer Spray During Start-up of a Spacecraft Engine in Vacuum*R. Schmehl, J. Steelant*

Aerothermodynamics Section TOS-MPA/ESTEC, ESA, Noordwijk, The Netherlands.....18-3

Experiments and Molecular Dynamics Simulations of Supercritical Nitrogen Injection*K.F. Ludwig¹, M.M. Micci¹, W. Mayer²*

1. Department of Aerospace Engineering The Pennsylvania State University, USA

2. DLR Lampoldshausen, Germany.....18-4

Molecular Dynamics Calculations Of Near-Critical Lox Droplet Surface Tension*M.M. Micci¹, S.J. Lee¹, B. Vieille², C. Chauveau², I. Gokalp²*

1. Department of Aerospace Engineering, The Pennsylvania State University, USA

2. CNRS, Orleans, France.....18-5

19. Metal Sprays**Powder Generation from Melts with High Viscosity***C. Czisch, H. Lohner, U. Fritsching, K. Bauckhage*

Dept. of Chemical Engineering, University of Bremen, Germany.....19-1

Qualitative Analysis of Metal Droplet Impact on Non-Solid Surfaces*M. Kresina, G. Schulte, K. Bauckhage*

Sonderforschungsbereich SFB 372 / Universität Bremen, Germany.....19-2

Numerical Simulation of Metal Thermal Spraying*J. Anagnostopoulos, D. Bouris, K. Nikas, G. Bergeles*

Dept. Of Mechanical Engineering, National Technical University of Athens, Greece.....19-3

Injection of Oversprays in a Metal Sprays - Local Mass Flux and Enthalpy Distribution*A. Schneider, V. Uhlenwinkel, K. Bauckhage*

University of Bremen, Germany19-4

On-line Control of the Spray Forming Process Using Phase-Doppler-Anemometry*J. Ziesenis, K. Bauckhage*

Institut für Werkstofftechnik, Universität Bremen, Germany19-5

A New Technique for Molten Metal Atomization*V. Uhlenwinkel¹, L. Achelis¹, S. Sheichaliev², S. Lagutkine²*

1. Institut fuer Werkstofftechnik, Bremen, Germany

2. NPI MIFI Ural Netram, Russia19-6

Adhesion of Molten Metal Droplets Impacting a Stainless Steel Surface with High Velocity*R. Dhiman, S. Chandra*

Department of Mechanical & Industrial Engineering, University of Toronto, Canada19-7

Modelling Secondary Breakup of Melts in Sprays*S. Markus, U. Fritsching*

Universität Bremen, Germany19-8