ASME
SETTING THE STANDARD

Fluids Engineering

The Fluids Engineering Division is involved in all areas of fluid mechanics, encompassing both fundamental as well as applications

Chair's Message

by James A. Liburdy, Ph.D.

Dear FED Members,

I am pleased to be writing to all of the Fluids Engineering Division members to report on some new and exciting activities within the division. Our goal is to help improve member participation by making it a rewarding and productive part of your professional activities. Currently the FED has approximately 3500 members with another 4200 identified as secondary division members. We also would like to continue to reach out to potentially new members to broaden out impact, to become the premier professional society for those working in the broad areas of fluid mechanics. To this end we encourage your comments and ideas as we move forward.

This past summer we had a rather unique event, a collocated conference with the Heat Transfer Division, the Advanced Energy Division, and the Nanotechnology Institute, located in Jacksonville, FL. The meeting was organized to allow participants to attend sessions sponsored by each division, and papers from each conference were available for all who registered for any of the individual conferences. This event brought together people working in diverse yet highly overlapping areas and hopefully spawned many contacts and potential collaborations for the future. The conference attracted over 750 paid attendees with a truly international flair. Each conference had two plenary speakers, for a total of eight. For FED Dr. William K. George of Chalmers University was awarded the Freeman Scholar and presented a lecture on the effects of initial and upstream conditions on turbulence shear flows, and Stuart Jessup provided an historical perspective of Naval propulsor design.

The FED is an active participant in the ASME IMECE conference held each November, and last year, in Boston, IMECE 2008 was no exception. At Boston, FED organized twelve different symposia or fora. Since this conference is organized into major Tracks, FED participated in seven different tracks, ranging from Heat Transfer, Fluid Flows and Thermal Systems, to Energy Systems, Emerging Technologies and others. The more technically oriented IMECE, compared with the past, includes a wide range of technical events and again provides a great opportunity for those involved in fluid mechanics to engage with other disciplines. In addition, IMECE is where FED holds its Young Engineer Paper Contest, which has been spearheaded by Dr. Terry Beck over the last several years. This has turned into a truly international event, with competitors from around the global coming to participate. This contest is based on submitted papers by undergraduate or early graduate students. The papers can be part of a team project or have single authors. Typically six papers are invited to

(continued on page 2)

Spring 2009 Newsletter
James C. Meng *Editor*

Chair's Message (continued from page 1)

attend IMECE and present their work, with final judging based on both the written and oral presentations, and awards are presented at the FED Reception. Some travel support is available. We encourage all students to consider participating in this event, the deadlines closely coincide with IMECE due dates.

The next FED Summer meeting is scheduled to take place August 2-5, 2009 in Vail Colorado. Dr. Joel Park is the General Chair and Dr. Mo Hosni is the Technical Chair for the conference. At the time of writing this report over 500 abstracts have been submitted and it looks to be a great conference in a wonderful place. Beginning with this conference a new format will be implemented for the plenary speakers. Each Technical Committee now identifies a plenary speaker that is closely aligned with the topical coverage of the technical sessions being organized by their committee. The goal is to provide a more focused forum that includes recognized experts in specific fields during the conference. We anticipate this new format will attract recognized world renowned speakers and expand the overall participation of the conference. The plenary speakers selected for the FEDSM 2009 in Vail are: Drs. Ronald Adrian (Arizona State), Clayton Crowe (Washington State), Willian Oberkampf (Sandia Lab.), Darius Modarress (Measurement Science Enterprise) and PhillippeSpalart (Boeing), with Ron Adrian being selected as this years Fluids Engineering Award winner. Evidence that this seems to be a positive change in the format of the Summer Meeting is the large number of submitted abstracts. Also, there will be a student poster competition with cash award at Vail. I invite all to visit the conference web site at http://www.asmeconferences.org/fedsm09/

In closing I want to invite all to be active participants in the Fluids Engineering Division. New programs continue to emerge and we want to be responsive to members' needs and their new ideas. If planning to attend either the Summer Meeting or IMECE please plan to attend one of our six Technical Committees, all are welcome. Come hear what is being planned for the future and participate as much as time and energy will allow. Alternatively, you are welcome to contact me or one of the Technical Committee Chairs, to discuss how to become involved. Additional information is continually updated at our web site http://divisions.asme.org/FED/. ■

Warm regards,
James A. Liburdy, Ph.D.
Executive Committee Chair
Fluids Engineering Division

Young Engineer Paper Contest

The ASME Fluids Engineering Division (FED) is again sponsoring the Young Engineer Paper (YEP) Contest for the **2009 International Mechanical Engineering Congress & Exposition (IMECE), November 31 – November 19, 2009, Lake Buena Vista, Florida, at the Walt Disney World Swan & Dolphin Hotel.**

This contest may be entered by undergraduate students, recent baccalaureate engineers (i.e. graduation after April 2008), beginning graduate students (i.e. start of graduate studies after April 2008)

Contest participants first submit a 500-word abstract describing their fluids engineering research paper. This paper could be the result of a project completed either at a university or in industry. Based on the abstract, contestants will be invited to submit a full-length (approximately 6000-word) paper. These papers will be reviewed by the FED Young Engineer Paper Contest Committee. The authors of up to five of the best papers will then be selected as finalists. Based on the recommendations of the reviewers, finalists will revise their papers to match ASME publication guidelines. The revised finalized papers will be published in the conference proceedings.

Those selected as finalists will be invited to present their papers at a special session held at the IMECE Conference where selection will be made for the following awards: First Place $500, Second Place $300, Third Place $200, and all other papers will receive $100 for being selected as a finalist. In addition, conference registration will be waived for the presenting author for each paper and travel expenses will be provided up to $750 per paper to help defray costs of attending the IMECE Conference. All finalist papers will receive certificates acknowledging the First Place, Second Place, and Third Place award winners, as well as the Finalist participants.

Hurry, you still have time to submit an abstract!

Please visit the IMECE 2009 home page http://www.asmeconferences.org/congress09/index.cfm, click on the **Submit Abstract** link on the left side of the page in the dark blue navigation bar area and follow the step by step instructions. The YEP Contest is located in Track 10-13. **If the web links are not accessible, you may also submit your abstract directly to:**

Dr. Terry Beck
3002 Rathbone Hall
Department of Mechanical & Nuclear Engineering
Kansas State University
Manhattan, KS 66506-5205
Tel: 785-532-2604
Fax: 785-532-7057
Email: tbeck@ksu.edu

FED Committee Reports

Fluid Measurement and Instrumentation Technical Committee

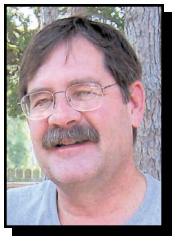
Theodore (Ted) J. Heindel, Ph.D., FMITC Chair

The Fluids Measurement and Instrumentation Technical Committee (FMITC) is the ASME Fluids Engineering Division committee devoted to measurement techniques and their application to fluid flows. The scope of the committee's goals include both experimental technique development and application in academia and industry. The primary activity of the FMITC includes development and organization of technical sessions at the Fluids Engineering Division summer meetings and the fall IMECE meetings. Since fluid measurements are common to all experimentalist, the FMITC also collaborates with other FED technical committees in co-sponsoring technical sessions. The committee's membership represents a broad spectrum of backgrounds, including industry, government laboratories, and academia. The types of measurements and instrumentation include those applicable to subsonic and supersonic flows, multiphase flows, large-scale flows, microfluidic flows, and many others. The FMITC goal is to be at the forefront of new measurement techniques and to provide a forum to exchange measurement and instrumentation ideas, developments, and applications.

The FMITC meets at the ASME FED Summer Meeting and at the ASME IMECE meeting. Non-members from students to seasoned professionals are encouraged to attend these meetings, which are announced in the respective conference program. We are continually looking for new members to assist in, as well as develop new, technical sessions addressing measurement and instrumentation issues. We also encourage those from other ASME divisions and technical committees to attend to develop collaborative technical sessions which extend the applications of fluid flow measurement and instrumentation to other disciplines, such as heat transfer, bioengineering, energy systems, etc. Examples of recent technical sessions sponsored or co-sponsored by the FMITC include: Forum on Fluid Measurement Uncertainty Application, Panel on CFD/EFD Choice – A Dilemma for Industries, Symposium on Non-Invasive Measurements in Single and Multiphase Flow, Forum on Fluid Measurements and Instrumentation, and Forum on Automotive Flows.

If you have any questions or suggestions for the FMITC, please contact the chair, Ted Heindel at theindel@iastate.edu, or the vice-chair, Pavlos Vlachos at pvlachos@vt.edu. ■

Computational Fluid Dynamics Technical Committee (CFDTC)



Richard W. Johnson, PE Chair, CFDTC, Idaho National Laboratory

This summer at the 2009 FEDSM in Vail, Colorado, the CFDTC will host its historically important symposia on new CFD algorithms, new and traditional turbulence modeling approaches, fluid-structure interaction and flow-induced noise and general CFD applications. In addition, CFDTC joins FMTC in hosting a symposium on verification and validation in CFD. In conjunction with the V&V symposium, the CFDTC has invited Dr. Bill Oberkampf to present a plenary talk at the FEDSM addressing this very issue.

While we may view the historical areas of CFD interest as being the most fun to work with, as engineers, we must also engage ourselves in the perhaps not so exciting task of qualifying our CFD simulations for the benefit of the recipient or user of those calculations. We need to verify our CFD coding, verify our calculations and validate our calculations. We all know that anybody who can run a computer application and click on options can produce a "CFD simulation." But how good is that simulation? Has it been processed through the various procedures that we know to be basic to its acceptability? Are we conversant with the terminology that has come to be generally accepted in the V&V community. How about our management? Do they know what is required to qualify a CFD calculation?

There are a number of subjects relating to the practice of V&V that can actually be quite deep and may strain our intellectual capacities. For instance, we would like to be able to quantify the numerical uncertainty of the calculation. How do we do that? Is there more than one way? Do we have to use 2 or more grids to do it? Also, there is a need for a quality database of experimental data that can be accessed by CFD practitioners whose contents is comprised of validation data sets that are complete and also have a qualification pedigree, especially a good uncertainty analysis. When we then attempt to use data from the validation database, we need to do better than provide the usual "viewgraph" norm comparison. That is, there should be one or more procedures that produce some kind of numerical metric such as a confidence interval that quantifies the simulation versus the data. Many of these procedures are still subjects of research and improvement. You should become acquainted with them and their genesis.

If we want the (engineering) world to accept our CFD magic as reliable approximations of reality, we have to provide the pedigree or list of quality assessments that have been performed to qualify it. We must be conversant with the terminology and the procedures that comprise it. In many regards, CFD is a mature engineering science, though we hope to be able to continually improve on existing techniques. But we must also certify our work to our customers so that its full power can be taken advantage of and appreciated.

We invite all to attend the plenary talk by Dr. Oberkampf who is an acknowledged expert in V&V and has served on a number of task forces to develop and codify V&V practices and procedures. He is also in the process of co-authoring a book on V&V practices. We also invite you to participate in future V&V symposia we hope to hold at future FED summer meetings. ■

Fluid Applications and Systems Technical Committee (FASTC)

S. A. Sherif, Ph.D., Chair
& D. Keith Walters, Ph.D., Vice-Chair
FASTC, Fluids Engineering Division

The Fluids Applications and Systems Technical Committee (FASTC) continue to promote the advancement and dissemination of fluids engineering research and technologies in several wide-ranging single- and multi-disciplinary topic areas. These include such traditional disciplines as fluid power systems, turbomachinery, automotive flows, and industrial and environmental fluid mechanics, and can include less traditional topics such as biological and biomedical systems, chemical processing, or fluid vibrations and acoustics. The primary function of the committee is to coordinate and organize research symposia at two major venues for fluids engineering—the annual ASME Fluids Engineering Division Summer Meeting (FEDSM) and the ASME International Mechanical Engineering Congress and Exposition (IMECE)—as well as other FED sponsored meetings and events. Researchers and engineers from academia, industry and government are encouraged to meet and exchange information on these and other topics through their participation in FASTC.

(continued on page 4)

FED Committee Reports: (continued from page 3)

The 2009 FEDSM in Vail, Colorado features two symposia and two fora sponsored by FASTC, including the Sixth International Symposium on Pumping Machinery, the 16th Symposium on Industrial and Environmental Applications of Fluid Mechanics, the 21st Forum on Fluid Machinery, and the Forum on Automotive Flows. At the 2009 IMECE meeting in Orlando, FASTC will sponsor the 18th Symposium on Industrial Flows and co-sponsor the Symposium on Turbomachinery Noise with the Aero/Hydro Acoustics Committee of the Noise Control and Acoustics Division (NCAD).

One of the primary goals of FASTC for 2009-2010 is to increase participation, both in the technical sessions and in the committee meetings. As such, we encourage all interested individuals from academia and industry to participate in the FASTC activities scheduled for the annual summer and winter meetings. We also remind members and prospective members that this is your committee—we welcome input and suggestions for future meetings. If you are interested in volunteering with the committee, or if you have any questions or concerns, please don't hesitate to contact the Chair, S.A. Sherif at the University of Florida (sasherif@ufl.edu) or the Vice Chair, Keith Walters at Mississippi State University (walters@me.msstate.edu). ■

Micro and Nano Fluid Dynamics Technical Committee (MNFDTC)

Kendra Sharp, Chair & Prashanta Dutta, Vice-Chair, MNFDTC, Fluids Engineering Division

Most of the MNFDTC activity is centered around the organization of a number of sessions (13 last year!) at the IMECE November meetings. We are becoming increasingly involved with the FED Summer Meeting. In addition, we have an awards subcommittee and a keynote subcommittee assisting with organizational responsibilities related to the conferences and nominations for FED-level awards. Here we include reports from MNFDTC members in leadership roles for conference session/symposium/forum organization or MNFDTC subcommittees. There are many opportunities for volunteering; these symposia including awards and keynote speakers would simply not happen without the dedication of TC members! Anyone wishing to become involved with the MNFDTC can contact the current chair, Kendra Sharp (ksharp@mne.psu.edu). The TC now meets at both the FED summer meeting and the IMECE meetings.

David Sinton (University of Victoria): MNFDTC Awards Subcommittee

We had many excellent papers and presentations again this year at IMECE. To recognize authors and presenters, the Fluids Engineering in Micro- and Nanosystems Symposium Technical Committee present one best paper and one best presentation award yearly. The best presentation award is reserved for students and the best paper award is for all authors involved on the chosen work. The 2008 symposium recognized Mr. Anmiv Prabhu of Dr. Minjun Kim's research group (Drexel University) as best presenter. The 2008 best paper award recognized authors the following authors: Srinidhi V. Murali, Xinggao Xia, Ashish .V Jagtiani, Joan Carletta and Jiang Zhe (University of Akron) for their work, "A Microfluidic Device for Wear Detection in Lubricants".

Dan Maynes (Brigham Young University): Microfluidics sessions at FEDSM09

The Micro and Nano Fluid Dynamics Technical Committee will be hosting the 2nd annual Microfluidics Summer Forum as part of the ASME Fluids Engineering Division Summer Meeting in scenic Vail, CO from August 2-5. Six technical sessions devoted to nano- and microscale flows are planned, with nearly 30 submitted papers. The forum is an excellent venue for reporting the latest developments in the uses of fluid mechanics for the design and optimization of micro- and nanoscale devices for mechanical, chemical and biological applications and devices in research and industry.

Prashanta Dutta (Washington State U): Microfluidics Symposium at IMECE2008

Organizer: Prashanta Dutta, Washington State University

Co-organizer: David Erickson, Cornell University

Co-organizer: MinJun Kim, Drexel University

The 2008 IMECE Microfluidics symposium was very successful. This symposium was co-sponsored by the Track 10 (Heat Transfer, Fluid Flows, and Thermal Systems) and Track 13 (Micro and Nano Systems). In this symposium, authors presented their research work ranging from highly theoretical to highly device oriented. The technical sessions for microfluidic symposium started on Monday and ended on Thursday. Here are the detail breakdown of sessions and technical papers.

Total number of technical sessions:
13 (2 in track 10 and 11 in track 13)

Total number of presentations:
57 (10 in track 10 and 47 in track 13)

Invited Talks: 2 ■

Fluid Mechanics Technical Committee (FMTC)

Francine Battaglia, Chair & Javid Bayandor, Vice-Chair

The Fluid Mechanics Technical Committee is dedicated to organizing and promoting technical activities within ASME related to fluid mechanics. Members of the FMTC volunteer their serves to develop, organize and promote symposia and panel discussions on fundamental and contemporary topics relevant to the research community. Often, these platforms are held twice per year at the International Mechanical Engineering Congress & Exposition (IMECE) and Fluids Engineering Division (FED) Summer Meeting.

The FMTC is pleased to announce that Prof. Mory Gharib, the Hans W. Liepmann Professor of Aeronautics and Professor of Bioengineering at Caltech, will be a plenary speaker at the 2009 Fluids Engineering Division Summer Meeting to be held in Vail, CO this August. For further information about the meeting and plenary speakers, please visit www.asmeconferences.org/FEDSM09/

To coincide with the annual conferences, the FMTC holds a business meeting at the IMECE and FED events. Election of the FMTC officers was held at the 2008 FED Summer Meeting in Jacksonville, FL, after which the officers serve a two-year term (2008-2010). During the business meeting held at the 2008 IMECE in Boston, MA, the FMTC members passed a motion to allow only two format types when authors submit abstracts for meeting presentations. Beginning with the 2009 IMECE, authors will have the option of either submitting a full technical paper for presentation, which will also be reviewed and published in the proceedings, or giving a presentation only (abstract but no paper). We hope these options will promote and encourage more author participation in the sessions sponsored by the FMTC.

During the last few years, we have watched the membership of the FMTC grow to include involvement from graduate students, postdoctoral research associates, and junior faculty members. The infusion of new members helps the FMTC sustain our professional activities. Without the support and dedication of the FMTC members, we would not be able to offer the variety of technical sessions held at the annual conferences.

(continued on page 5)

FED Committee Reports: (continued from page 4)

We cordially invite you to join the FMTC. If you are interested in joining, please either come to one of the annual business meetings or contact either Francine Battaglia (fbattaglia@vt.edu) or Javid Bayandor (javid.bayandor@rmit.edu.au). We hope to see you in Vail this summer. ■

Multiphase Flow Technical Committee

Malcolm J. Andrews, Ph.D., MFTC Chair

The main goals of the Multiphase Flow Technical Committee are to broaden the participation in the ASME activities of engineers and scientists from different fields of multiphase flow and particle technology, particularly young professionals, and to increase the interaction with other professional societies from the US and abroad. Another important objective is to maintain the high quality of the papers presented and published in the ASME Proceedings and the Journal of Fluids Engineering. A special emphasis is given to symposia on emerging areas of research.

This issue FED Newsletter has two interesting articles about leading edge multiphase flows from members of our MFTC, we hope you enjoy.

The committee takes an active role in the FED summer fluids (FEDSM09) and ASME winter meeting (IEMCE09), with summer 2009 having five major international Symposia/Fora namely, "11th International Symposium on Liquid-Solid Flows", "11th International Symposium on Gas-Liquid Two-Phase Flow", "12th International Symposium on Gas-Particle Flows", "9th International Symposium on Numerical Methods for Multiphase Flows", and "44th Cavitation and Multiphase Flow Forum." In addition, the MFTC is sponsoring a new and exciting Fora at the FEDSM09 titled "MULTIPHASE PROCESSES IN GEOPHYSICAL AND ENVIRONMENTAL FLOWS" with such distinguished speakers as Professors Tony Maxworthy (USC) and Gary Parker (UIUC), and over 20 submissions to-date.

Although we might be the oldest FED Technical Committee, we are always pleased to welcome new and active members. Please feel free to contact the chair, Malcolm Andrews at mandrews@lanl.gov, or the vice-chair, Mark Duignan at mark.duignan@srnl.doe.gov.

http://divisions.asme.org/FED/Multiphase_Flow.cfm

FED Awards

Freeman Scholar Award

Timothy O'Hern, Ph.D.
Chair, Freeman Scholar Program
Fluids Engineering Division

The Freeman Scholar Award is awarded biennially for an application of fluids engineering. The recipient of the award must present a lecture in the FEDSM annual meeting and write a comprehensive review article for the Journal of Fluids Engineering. We had two awardees in 2007, Dr. Bill George, who presented an excellent, well-attended and thought-provoking lecture at the FEDSM-2008 in Jacksonville FL and we are looking forward to hearing Dr.Joseph Klewicki's lecture at FEDSM-2009 in Vail, CO and read his review article in the JFE.

The members of the Freeman Scholar Award committee are: Dr. Stathis Michaelides (chair), Dr. Timothy O'Hern, and Dr. David Stock (members). Nominations will be sought for the 2010 Award in the Fall of 2009. Details will be posted during the summer of 2009 at: http://www.asme.org/Governance/Honors/SocietyAwards/18th_Freeman_Scholar_Program.cfm

Adiel Guinzburg, Ph.D.
Honors & Awards Chair

Fluids Engineering Award

The Fluids Engineering Award is conferred upon an individual for outstanding contributions over a period of years to the engineering profession and in particular to the field of fluids engineering through research, practice or teaching. The recipient of the 2008 Fluids Engineering Award is Ching-Jen Chen, Professor at Florida State University. Prof. Ching-Jen Chen received a diploma in Mechanical Engineering from Taipei Institute of Technology in 1957 and came to the United States in 1960. He received a master's degree in Mechanical Engineering from Kansas State University in 1962 and completed his Ph.D in Mechanical Engineering at Case-Western Reserve University in 1967. Professor Chen was on the faculty at the University of Iowa from 1967 to 1992, serving as the Chair of the Department of Mechanical Engineering from 1982 to 1992. Since 1992 he has served as the Dean of Engineering for both Florida A&M University and Florida State University. He is Professor of Mechanical Engineering, affiliated Professor in Biomedical. Engineering and a research associate with the Geophysical Fluid Dynamics Institute of Florida State University. Dr. Chen has made contributions in teaching and research on turbulent flows and heat transfer, turbulence modeling, computational fluid dynamics and flow visualization. Recently he has also begun research in biomedical engineering, magnetic effects on biological cells, magnetic micro devices and nano technology.

Robert T. Knapp Award

This award is given for the best paper presented at the Fluids Engineering Division sponsored sessions dealing with analytical, numerical and laboratory research. The 2008 Knapp Award was awarded to Shigeru Awazu, Yutaka Abe and Satoshi Matsumoto for their paper entitled "Study On Nonlinear Deformation Behaviors Of Electrostatic Levitating Liquid Drop." This paper is published in the Proceedings of the 2007 ASME Fluids Engineering Summer Conference (FEDSM2007-37193). **Shigeru Awazu** obtained his Bachelor of Engineering in Engineering Systems in 2006, and Master of Engineering in Systems and Information Engineering in 2008 both at the University of Tsukuba, Japan. His master's thesis was "Study on Nonlinear Dynamics of Liquid Drop Levitated by Electrostatic Force", under the supervision of Professor Yutaka Abe, and as a researcher at the Japan Aerospace Exploration Agency. Since 2008, he has been at the HONDA Motor Co., Ltd. **Satoshi Matsumoto** graduated in Mechanical Engineering (B.Sc and M.Sc) and obtained a PhD (1996) in Mechanical Engineering at Toyo University, Japan. He was a Post Doc at the Japan Science and Technology Agency and worked at the National Space Development Agency of Japan to perform a numerical simulation on convection with crystal growth. He joined the National space Development Agency of Japan (currently the Japan Aerospace Exploration Agency) as a Researcher. He is interested in thermocapillary convection experimentally and numerically. He is studying nonlinear drop dynamics levitated by electrostatic force. **Yutaka Abe** is the Dean of the College of Engineering Systems, University of Tsukuba, since 2008. He is a Professor of Department of Engineering Mechanics and Energy, University of Tsukuba, since 2003. He has research careers in Japan Atomic Energy Research Institute, Los Alamos National Laboratory, Yamagata University in Japan and University of Toronto in Canada, before he moved to the University of Tsukuba. His areas of expertise are the transport phenomena in two-phase flow and fluid flow control. He has over 100 papers in journals and refereed international conference papers.

Lewis F. Moody Award

The Lewis F. Moody Award is given for the best paper presented at the Fluids Engineering Division sponsored sessions dealing with a topic useful in mechanical engineering practice. The 2008 Moody Award was presented to M. Boutaous, P. Bourgin, A. Maazouz, P. Chantrenne, E. Pérot for their paper entitled "Heat Transfer And Air Diffusion Phenomena In A Bed Of Polymer Powder Using Apparent Heat Capacity Method: Application To The Rotational Molding Process." This paper is published in the Proceedings of the 2006 ASME Fluids Engineering Summer Conference (FEDSM2007-37181). **Boutaous M'hamed** is associate Professor since January 2005 at the National Applied Science Institute of Lyon (France) after being Associate Professor since September 2000 at the Plastic Engineering School in Oyonnax (France). He obtained his PHD: 1998, from the Institute of Fluid Mechanics, University of Strasbourg (France) He is responsible for the Heat Transfers in Polymer Materials and Plastic Engineering Processes Research Group at the Thermal Research Center of Lyon. His current research interests are: heat transfer in polymer materials and processing, Modeling and numerical simulation of the coupling between heat transfer, rheology and polymer properties, Fluid flow in confined rough geometries, modeling of high speed winding process and stress based control

(continued on page 6)

FED Awards: (continued from page 5)

of thin plastic film rolls. Boutaous has 10 published papers, 25 proceedings of international conferences, several Conferences and industrials reports In 2001, he received the « Gold Price for Original Concept » and « Silver Price for Invention » from the Japan Society of Advanced Sciences, for a research work in collaboration with Professor P. Bourgin and entitled Intelligent winding of flexible media: towards tailored surface topographies. **Patrick Bourgin** obtained his Master of Engineering Science from the Ecole Centrale de Lyon, Master of Applied Mathematics from the University of Lyon and Ph. D from the University of Lyon as well as D. Sc. from the University of Lyon. He is currently a director and professor at the Ecole Centrale de Lyon. He has 32 Publications in International Journals, 4 Keynote Conferences, 99 Communications in International Conferences with Proceedings, and 24 Invited Seminars. He received the Zellidja Foundation Scholarship (1968), two "Best Paper Awards" from the Society of Advanced Science, Japan (2000), Chevalier des Palmes Académiques (2003), Honda Kotaro Memorial Prize, Tohoku University, Japan (2007). He is a member, Editorial Advisory Board, International Journal of Non-Linear Mechanics as well as a member, Editorial Board, French Journal "Matériaux & Techniques". His biography is published in the Who's Who in the World, and in the Who's Who in Science and Engineering. He is Chair or co-Chair of several International Conferences. Patick is a referee, International Journal of Non-Linear Mechanics, Transactions of the American Society of Mechanical Engineers, Journal of Fluid Mechanics, Journal of non-Newtonian Fluid Mechanics, Transactions of the Institution of Chemical Engineers, A.S.L.E. Transactions. **Abderrahim Maazouz** leads the Multidisciplinary Plastics Research group at INSA Lyon. Abderrahim Maazouz created the new field "Mechanical and Plastics Processing" of which he is the director. He is the author of more than 80 scientific publications of which 60 are published in international journals, more than 60 communications at international conferences where he has on numerous occasions been an invited speaker. He is also the inventor of 4 world patents with applications. He participates regularly in the organization of international conferences in the field of polymers. He is regularly asked to review submitted articles for international scientific journals as well as to carry out research evaluations.

S. Gopalakrishnan—Flowserve Pump Technology Award

The Award was established in July 2006, with funding generously provided by the Flowserve Corporation, in honor of the late Dr. Sankaraiyer Gopalakrishnan, "Gopal". The first recipient of the award, Dr. John Tuzson, was a close friend and associate of Dr. Gopalakrishnan. Future awards are presented biennially in recognition of outstanding achievement in pump technology, documented through publications and testimonials of peers and co-workers and in keeping with Gopal's dedication to the education of the next generation of expert pump engineers. *The next award will be in 2009.*

FLUIDS Machinery Design Award

The Award, presented biennially, honors excellence in the design of fluid machinery. The recipient of the 2008 Fluids Machinery Design Award is Dr. Yu-Tai Lee. Dr. Yu-Tai Lee is Senior Scientist of the Computational Hydromechanics Division at Naval Surface Warfare Center, Carderock Division. With the Navy for over 26 years, Dr. Lee's achievements include developing and validating computational design tools for predicting machinery aero- and hydrodynamics and acoustics. Dr. Lee is well-known for his success in designing a series of high-pressure vaneaxial fans for the Navy's mission-critical shipboard ventilation systems which resulted in significant efficiency and acoustics improvements. His papers in acoustics pioneered acoustical source modeling for turbomachinery design applications. He also successfully coupled optimization schemes with CFD tools, which he then applied to air-conditioning compressors for the Navy's ships and centrifugal lift fans for the Navy's hover crafts using air-cushion technology. Dr. Lee's contributions not only highlight his skills of troubleshooting and resolving problems that emerge during machinery testing, but also demonstrate his extraordinary capability of designing original turbomachinery. Dr. Lee has organized numerous sessions on turbomachinery applications for both the ASME FED and IGTI conferences. He has been the lead organizer for the Symposia on Advances in Numerical Modeling of Aerodynamics and Hydrodynamics for Turbomachinery since its inception in 1998. In addition, he is the current Chair of the Fluid Applications and Systems Technical Committee of the FED. Since 2004, he has been serving as Associate Editor for the ASME Journal of Fluids Engineering. Dr. Lee earned a B.S. in mechanical engineering from National Taiwan University and a M.S. and Ph.D. in mechanics and hydraulics from University of Iowa. He is a registered Professional Engineer and holds two patents for his innovative fan and compressor designs. ■

Improving the Operation of a Cyclone Coupled with an Ejector

Wayne Strasser
Eastman Chemical Company, Kingsport, TN, USA Member, Fluids Engineering Division

Introduction

Unwanted dispersed matter (dust or droplets) in industrial vapor streams is a common problem. Cyclones, having relatively low costs of construction and operation, have been used since the late 1800s to separate these phases. Particle-laden gas enters through an inlet, swirls in a free vortex around the bulk of the unit, and proceeds into the forced vortex before exiting the top of the unit. Particle-rich gas leaves the bottom into a dust bin or other collection system. In the present work a Lappel cyclone coupled with an annular ejector is used to remove polyethylene dust from a dense gas stream. The goal is to optimize the system within strict geometric and operating constraints.

Model

Figure 1 shows the overall layout of the present work. A multitude of mesh blocks is used to minimize mesh spacing in areas of high gradients, cell skewness, cell aspect ratio, and cell centroid shifts. The grid size ranged from 570,000 to 740,000 cells, the vast majority of which are hexahedra. Two-equation turbulence models cannot account for coupling among the Reynolds-stress tensor components, concave surface turbulence enhancement, or counter gradient diffusion physics; therefore, a differential Reynolds Stress Model (RSM) solution will be sought. Mach numbers are significant in the present study, so compressibility, viscous heating, pressure work, and the kinetic energy terms were resolved. The dispersed phase is approached using a Lagrangian stochastic discrete random walk (DRW) method [1]. A commercially available pressure-based, 64-bit, finite volume, double precision code, Fluent 6.3.26, was used to solve the equations governing momentum, heat, and turbulence in both phases in space and time. The convective terms of the momentum equations were discretized using a QUICK scheme. A timestep size and sub-iteration count were chosen such that RMS residual "flattening" (continuity of order 10-5) was achieved and the instantaneous mass imbalances were less than +/- 1%. Each run proceeded in two stages: 1) development of statistically stationary (quasi-steady) flow and 2) time-averaged data collection. To help decide what exactly represents "enough" time for the first stage, 22 values, such as turbulence kinetic energy and Mach number, were monitored during the runs.

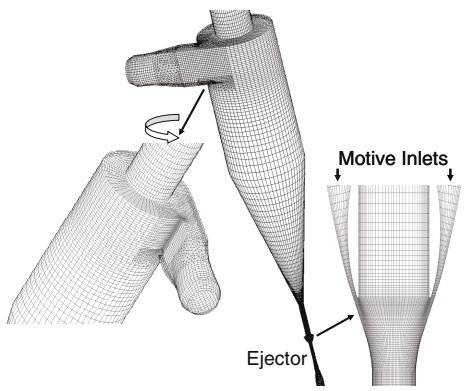


Figure 1: Computational mesh for coupled cyclone/ejector

Flow Features

Figure 2 offers typical instantaneous contours of tangential velocity, temperature, and dust concentration. An expected strong swirling motion is seen with an asymmetric approach to the lower outlet [2]. Hot vapor is fed to the inlet, and hot motive fluid is fed to the ejector. Gas expansion lowers the temperature in the center of the cyclone. The clean (upper) outlet is relatively warm and is likely a combined effect of strong radial turbulent thermal diffusion near the vortex finder [3] and bypassing of the feed flow to the vortex finder. The particle concentration contours show an expected increase in concentration near the walls of the cyclone and vortex finder. There are also interior lobes of higher concentration dropping down to the lower part of the straight cyclone section, and some particles (entrainment) are seen making their way back up the center in the return vortex. Notice also the relatively high concentration of particles just under the vortex finder. Bypassing appears to be the dominant mechanism for particle carryover. The particle concentration contour shapes, especially the interior "bands", change dramatically in time. The quasi-steady behavior is exemplified in Figure 3, showing a typical time series plot of the overall system separation efficiency.

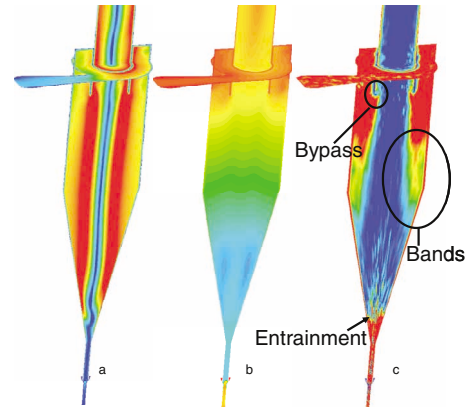


Figure 2: Instantaneous tangential velocity, temperature, and particle concentration contours

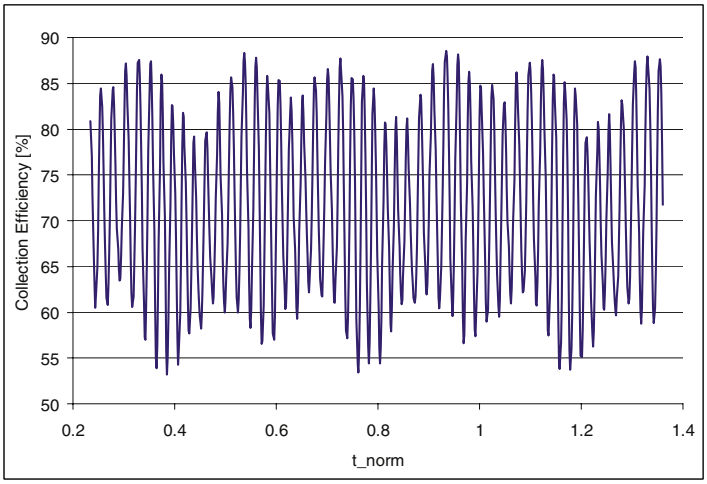


Figure 3: Time series of quasi-steady particle collection efficiency

(continued on page 8)

Improving the Operation of a Cyclone Coupled with an Ejector: (continued from page 7)

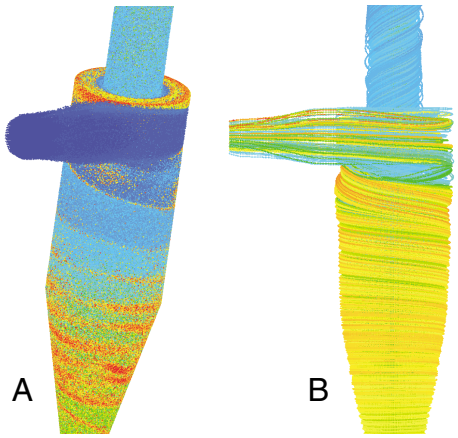


Figure 4: Instantaneous particle tracks colored by residence time and instantaneous continuous phase path lines calculated in reverse from the outlet colored by residence time.

Figure 4a shows instantaneous Lagrangian particle tracks released from the cyclone inlet colored by residence time. Particle concentration helical striations are seen forming in the cyclone ([2], [4]). There is evidence of strong bypassing of the particles under the vortex finder. The shades of blue (low residence time) proceeding vertically out of the clean top indicate a short period of time that particles are in the unit. Bypassing is further explored in Figure 4b. Here, the continuous phase is traced by residence time moving in reverse from the clean outlet. Shades of blue (low residence time) are seen in various positions in the inlet. Another interesting feature is the particles caught in the secondary flows shown in red (long times) near the cyclone roof discussed in [2]. Typical instantaneous tangential velocity contours on an ejector midplane are shown in Figure 5. Three uncorrelated time steps have been sampled to show the unsteady nature of the flow. Rings of helical flow are shed as the vorticity of the swirling cyclone flow re-orients upon meeting the high-speed ejector motive steam. It can be

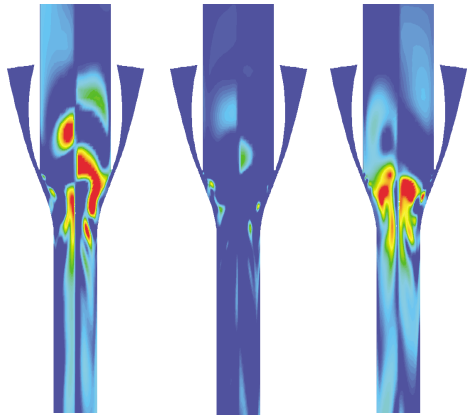


Figure 5: Instantaneous tangential velocity contours in the ejector at three uncorrelated time steps

seen that the effects of the cyclone are chaotically felt deep in the ejector. It was found that the state of the flow exiting the cyclone bottom affected the motive feed pressure balance. The pressure balance controls the ejector throughput. In turn, the amount of material ejected impacts the solids carryover rate. The two units could, therefore, not be separated computationally.

Conclusions

The complete work can be found in [5]. Six geometric configurations for improving the solids collection efficiency of a joint cyclone separator / ejector have been evaluated using an unsteady, compressible DRW with RSM approach in a commercial code, Fluent 6.3.26. Significant effort was placed on ensuring a converged solution with statistically sound data collection and time-averaging. It was found that an extended convergent vortex finder had the greatest improvement in particle collection, while the pressure drop increased markedly as expected. Two sizes of simple disk-shaped vortex breakers showed no improvement, while an extended vortex finder with a fixed diameter showed a decline in performance. A dust bin showed a very slight improvement, but the dust bin was a non-ideal design dictated by process space limitations. All particle collection directional changes were marginal. Solids collection did not necessarily correlate with tangential flow in the downpipe or ejector throughput. More work is planned to evaluate variants of these designs and others. In addition to six geometry evaluations, four numerical effects were considered: pressure-velocity coupling, pressure discretization, RSM pressure strain formulation, and wall reflection. Minor effects were found by changing from the linear to quadratic formulation. Almost no effect was seen when the pressure-velocity relations was handled in a coupled or SIMPLE approach. Very large changes were seen by choices for pressure discretization and the inclusion of wall reflection terms. It was concluded that a PRESTO! scheme and the linear pressure strain approach with no wall reflection are the most accurate and efficient approaches.

References

1. Strasser, W., "Discrete Particle Study of Turbulence Coupling in a Confined Jet Gas-Liquid Separator," Journal of Fluids Engineering, 130, 1-10, 2008.
2. Wang, B., Xu, D., Chu, K., and Yu, A., "Numerical study of gas-solid flow in a cyclone separator, " Applied Mathematical Modeling, 30, 1326-1342, 2006.
3. Liu, C., Wang, L., Wang, J., and Liu, Q., "Investigation of energy loss mechanisms in cyclone separators," Chem. Eng. Technol, 28, 1182-1190, 2005.
4. Gil, A., Cortes, C., Romeo, L., and Velilla, J., "Gas-particle Flow Inside Cyclone Diplegs with Pneumatic Extraction," Powder Technology, 128, pp. 78-91, 2002.
5. Strasser, W., "Improving the Operation of a Cyclone Coupled with an Ejector," ASME Paper No. IMECE2008-66601.

Unified Two-Phase CFD Modeling of Boiling, Cavitation, and Bubble Collapse

Ray A. Berry[a], Richard Saurel[b], Fabien Petitpas[b]

Key issues in nuclear reactor safety and optimization rely on in-depth understanding of basic two-phase flow phenomena with heat transfer and phase change. Among these issues, convective boiling under normal and elevated pressure conditions is one of the most challenging situations. Our inability to accurately predict heat transfer and associated boiling fluid topology transitions for two-phase flows under nuclear reactor flow conditions and fuel bundle geometries results in increased safety margins which impedes development of new fuel designs. With the advent of new generation codes and the increase of available computational power, it is believed (as evidenced at the recent international "Two-Phase Convective Boiling Flow Modelling" workshop [1]) that significant progress can be made by using specialized computational fluid dynamics (CFD) codes, thus leading to a drastic reduction in development costs. In Europe, and especially France, CEA, EDF, AREVA and IRSN have launched, among several projects covering a broad spectrum of space and time scales, the NEPTUNE [2] project, aimed at providing computational tools describing two-phase flow and heat transfer that are validated in the parameter range of industrial applications. In the United States no such unified effort exists; however, it seems necessary to promote collaborative research on this subject at the widest scale. A collaborative effort between the Multiphysics Methods Group at Idaho National Laboratory (INL) and the SMASH Team at École Polytechnique Universitaire de Marseille has recently begun to pursue these issues through development of a unified approach [3]. This short research note highlights one component of the broader developmental effort [3].

The purpose of this research is to develop the foundations needed to simultaneously solve both fluid dynamic interface problems and multiphase mixtures problems arising from boiling, cavitation, and bubble collapse in light water reactor systems. The two-phase flow phenomena occurring in light water nuclear reactors includes, especially with departure from nucleate boiling (DNB) and film boiling instability (boiling crisis), coolant phase changes and multiple flow regimes that directly influence coolant interaction with the fuel elements and assemblies, ultimately affecting reactor performance. Because of the inherent coupling, an understanding of these phemonena, along with subcooled boiling and bubble collapse, is also key to gaining an understanding of crud depostion in these systems. Our goal is to provide unified models giving highly resolved solution details where necessary, simultaneously with lower resolution, large-scale vessel/component solutions. This will be accomplished through the develoment of a well-posed, multiscale method that (1) resolves interfaces for larger bubbles with single velocity, single pressure treatment in a DNS-like (direct numerical simulation) manner using a fine computational mesh, and (2) averages (or homogenizes) the two-phase flow field for smaller bubbles, yielding a two-velocity two-pressure treatment, using a courser computational mesh.

Multiphase formulations have been developed to provide the ability to solve problems involving both heterogeneous mixtures of materials and interfacial flows involving compressibility with phase transition. In particular, for the DNS of interfacial flows which are of prime importance for nuclear reactor design optimization and safety analysis, the aim is to compute the critical heat flux conditions that involve a competition between bubble growth, surface tension, contact angle effects, and heat and mass transfers at interfaces. Contrary to the approach developed by other researchers, such as sharp interface tracking methods, our approach embraces a general model that accounts for complete thermodynamics in both phases. Because of the inherent weaknesses of sharp interface methods for DNS-like simulations, most notably their inability to dynamically create interfaces and to solve interfaces separating pure media and mixtures, we focused on a diffuse interface method (DIM) which does not exhibit these weaknesses. DIM considers interfaces as numerically diffused zones corresponding to artificial mixtures created by numerical diffusion. The determination of thermodynamic flow variables in these zones is achieved on the basis of multiphase flow theory. The challenge is to derive physically, mathematically, and numerically consistent thermodynamic relations for the artificial mixture. The same solution method is implemented globally in both pure fluids and in mixture zones. For this research the numerical approximation of the five-equation, two-phase flow model of Kapila (zero-order approximation of the seven-equation model with stiff relaxation) [4], which has shown excellent capabilities for numerical resolution of interfaces separating compressible fluids and wave propagation in compressible mixtures, was examined. For several reasons, its numerical approximation poses serious difficulties. In our work, these difficulties were circumvented by restoring pressure non-equilibrium effects using a pressure non-equilibrium model developed in [5]. This resulted in a single velocity, non-conservative hyperbolic model with two energy equations involving relaxation terms; it fulfills the equation of state and energy conservation on both sides of interfaces and guarantees correct transmission of pressure waves across them. This formulation considerably simplifies numerical resolution by building a simple and efficient method for numerical approximation of this flow model in the context of diffuse interfaces. Further details of the method and results are given in [5].

To demonstrate the multidimensional capability, a two-dimensional test, involving a Richtmyer-Meshkov instabilitly (RMI), is presented from [5]. The liquid is not pure and new interfaces will appear during development of the instability due to cavitation effects. The shape of the resulting interface and the entire flow field show a non-conventional behavior, never computed before, as the model and method must deal with liq-

[a]Idaho National Laboratory, Idaho Falls, Idaho, USA. Email: Ray.Berry@inl.gov
[b]École Polytechnique Universitaire de Marseille, Marseille, France.

(continued on page 10)

Unified Two-Phase CFD Modeling of Boiling, Cavitation, and Bubble Collapse: (continued from page 10)

uid-gas interfaces and the dynamic appearance of gas pockets in severe conditions. The physical domain is 3 m long and 1 m high, with the left part of the computational domain filled with nearly pure water and the right part with nearly pure gas. They are initially separated by a curved interface, a portion of a circle with 0.6-m radius centered at x=1.2 m, y=0.5 m. The mesh contains 900 cells in the x-direction and 400 cells in the y-direction. Both water and gas have an initial pressure of 1 atmoshere and an initial velocity of -200 m/s (to the left). The initial density of water and gas is 1000 kg/m^3 and 100 kg/m^3, respectively. Top, bottom, and left boundaries are treated as solid walls; right boundary is open. Both phases are treated with the stiffened gas equation of state [6]; therefore, both phases are assumed compressible. The water in the left part contains a very small volume fraction of gas, 10^{-6}, while the gas in the right part contains a very small volume fraction of water, 10^{-6}. The initial configuration is shown in the upper graphic of Figure 1, and the mixture density contours at times 0.0, 1.9, 3.9, 5.8, and 7.8 ms in the other graphics of the figure. When flow impacts the left wall, a right-traveling wave propagates in the domain through the water/gas discontinuity. A conventional RMI appears first. Then expansion waves are produced as the jet elongates. It results in expanded zones near the solid boundary where gas inhomogeneities grow, producing the *dynamic appearance of gas pockets* (white) and *interfaces*. Because the pressure is very low in these zones, the jet's dynamics are modifed from the conventional RMI in pure fluids. The various gas pockets near the solid boundary and in the jet core are clearly visible in Figure 1. Relaxation terms present in the volume fraction and energy equations are responsible for the dynamic appearance of these gas pockets. This would be very difficult to accomplish with current sharp interface tracking methods.

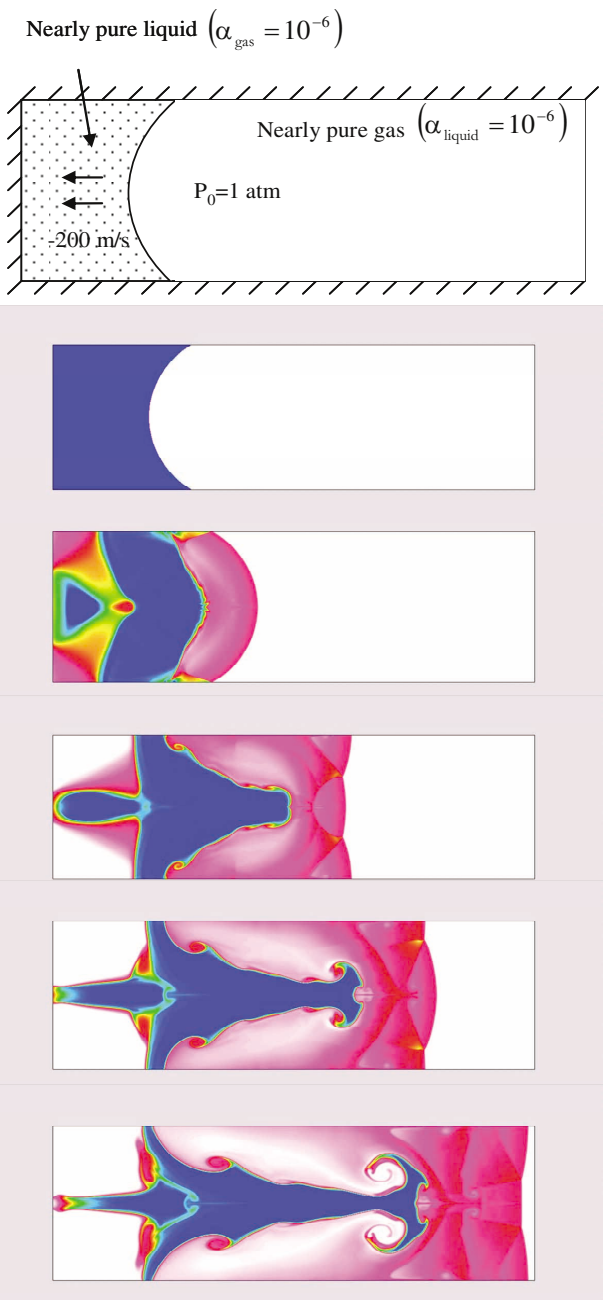


Figure 1. Configuration and mixture density contours at 0.0, 1.9, 3.9, 5.8, and 7.8 ms. Blue is high density, white is low, and others colors are intermediate.

By incorporation of interfacial surface tension and heat and mass transfer effects, this simple, efficient and robust method can be used to resolve fundamental boiling issues in a DNS-like manner similar to the cavitation example above. Furthermore, the various components employed in this method are general enough to merit coupling with additional complex physics and chemistry, e.g. to address the unwanted deposit of constituents dissolved in the coolant as a result of localized boiling — the so-called crud deposition problem.

Acknowledgments

The U.S. Department of Energy, Office of Nuclear Energy is acknowledged for partially funding this research through the Idaho National Laboratory under DOE Idaho Operations Office Contract DE-AC07-05ID14517.

References

1. Organized by the Societe Hydrotechnique de France and the International Association of Hydraulic Engineering and Research under sponsorship of Societe Francaise des Thermiciens, CEA, AREVA, EDF, and AFM. Held at Grenoble, France, September 8–9, 2008.
2. A. Guelfi, D. Bestion, M. Boucker, P. Boudier, P. Fillion, M. Grandotto, J.M. Hérard, E. Hervieu, and P. Péturaud, "NEPTUNE: A New Software Platform for Advanced Nuclear Thermal Hydraulics," *Nuclear Sci. and Eng.*, **156**, 281-324 (2007).
3. R.A. Berry, R. Saurel, F. Petitpas, E. Daniel, O. Le Métayer, S. Gavrilyuk, N. Dovetta, R.C. Martineau, *Progress in the Development of Compressible, Multiphase Flow Modeling Capability for Nuclear Reactor Flow Applications*, Idaho National Laboratory report INL/EXT-08-15002, October 2008. Available online at http://www.inl.gov/technicalpublications/Search/Search2.asp.
4. A. K. Kapila, R. Menikoff, J. B. Bdzil, S. F. Son, and D. S. Stewart, 2001,"Two-phase Modeling of Deflagration-to-Detonation Transition in Granular Materials: Reduced Equations," *Physics of Fluids*, **13**, 3002–3024.
5. R. Saurel, F. Petitpas, and R.A. Berry, "Simple and Efficient Relaxation Methods for Interfaces Separating Compressible Fluids, Cavitating Flows and Shocks in Multiphase Materials," *J. Comp. Physics*, **228**, 1678-1712 (2009).
6. O. Le Métayer, J. Massoni, and R. Saurel, "Elaborating Equations of State of a Liquid and its Vapor for Two-phase Flow Models," *Int. J. of Thermal Sci.*, **43**, 265-276 (2004).

Conferences

2009 Fluids Engineering Division Summer Meeting
Vail Cascade Resort and Spa
1300 Westhaven Drive, Vail, CO 81657 USA
August 2-6, 2009

The 2009 Fluids Engineering Division Summer Meeting is being held at the Vail Cascade Resort and Spa in Vail, Colorado. An exciting meeting is anticipated in the beautiful Rocky Mountains of Colorado, and all those with an interest in fluids engineering are invited to attend. A larger number of abstracts has been received than anticipated. The conference has accepted 500 abstracts. Consequently, the conference is being extended by one day from the originally published announcement.

Technical sessions will be on Monday through Thursday, August 3-6. Thursday will be a full day of sessions. Committee meetings and an opening reception are scheduled for Sunday, August 2. An author's breakfast will be provided each morning so that authors may meet with their session organizers. Each technical session will be 2 hours with nominally 5 papers per session with a maximum of 6 for a presentation time of 20 minutes for each paper. Keynote speakers will be allotted 2 time slots for their presentations or approximately 40 minutes. A total of 11 technical sessions are planned for the conference with 8 parallel topical sessions in each technical session.

The conference has scheduled 7 plenary speakers. The presentation time for each speaker will be 60 minutes with no other events scheduled. To date, six speakers have accepted our invitation. They include the following: Prof. Ronald Adrian of Arizona State University and 2009 Fluids Engineer Award winner, Prof. Clay Crowe of Washington State University, Prof. Mory Gharib of the California Institute of Technology, Dr. Darius Modarress of Measurement Science Enterprise, Dr. William Oberkampf of Sandia Laboratories, and Dr. William Spalart of Boeing Commercial Airplanes. Additional information on the speakers may be found on the FEDSM09 web page.

As usual, the conference will be international in scope. Of the 500 abstracts submitted, 320 are from 31 foreign countries. The number of foreign authors is almost double the number from the USA. The web page for the conference is http://www.asmeconferences.org/FEDSM09/index.cfm This web page should be reviewed periodically for updates in the program.

Vail Cascade Resort and Spa, Vail, Colorado

2009 Leadership Training Conference
The Westin Los Angeles Airport Hotel
Los Angeles, California
March 5-8, 2009

The fourth ASME Leadership Training Conference was held at the Westin LAX Hotel in Los Angeles on March 5-8, 2009. The total number of attendees was 314. The attendees were primarily leaders from the technical divisions and local sections. Dr. Joel Park represented the Fluids Engineering Division. The purposes of the LTC09 included the following: networking of division and section leaders, acquiring knowledge of the policies, organization, and services of ASME, learning leadership and management skills, and meeting with the key leaders of ASME including ASME President Thomas Barlow, President-Elect Amos Holt, and various members of the ASME staff.

During the conference, Joel met with Dr. George Papadopoulos of FED, Erin Dolan (ASME meeting manager for FEDSM09), and Harjit (Jeet) Hunjin of the Colorado Section. The primary purpose of the meeting was to discuss potential involvement of the Colorado Section with FEDSM09 in Vail Colorado. Joel also briefly met with Prof. Allan Kirkpatrick, Chairman of the Mechanical Engineering Department at Colorado State University. Contact was made with Marianne Chan from the Toronto Section and Twishansh Mehta of the University of Toronto Student Section concerning FEDSM10 in Montreal, Canada.

One of the concepts promoted at the conference was Early Career Programs for entry-level engineers with 0 to 5 years of experience. Additional details of the conference will be posted on the conference web page in the near future at

http://www.asmeconferences.org/ltc09/

Details to be posted on the web page will include all slide presentations and the posters for the various groups represented at the conference.

2008 International Mechanical Engineering Congress and Exposition
Sheraton Boston Hotel
Boston, Massachusetts
October 31-November 6, 2008

FED participated in ASME IMECE08 with both committee meetings and technical sessions. Most of the technical sessions for FED were located in Track 10, Heat Transfer, Fluid Flows, and Thermal Systems. Prof. Van Carey of UC Berkeley and the Heat Transfer Division was Track 10 Chair while Dr. Joel Park of FED was the Co-Chair. Track 10 consisted of 27 topics with 11 from FED. FED had 20 sessions with 74 papers in Track 10. Additional details are on the Congress 08 web page: http://www.asmeconferences.org/Congress08/TechnicalProgramOverview.cfm

Joel T. Park, Ph. D.
Executive Committee
FEDSM09 Conference Chair

Executive Committee (EC) 2008–2009

Chair
James Liburdy, Ph. D.
310 Rogers Hall
Department of Mechanical Engineering
Oregon State University
Corvallis, OR 97331-6001 USA
Tel: 541-737-7017 / Fax: 541-737-2600
james.liburdy@oregonstate.edu

IMECE2008 Track 10 Co-Chair
FEDSM2009 Conference Chair
Joel T. Park, Ph. D.
Naval Surface Warfare Center Carderock Div.
Seakeeping Division
Code 5500, Bldg. 18, Rm. 129
9500 MacArthur Boulevard
West Bethesda, MD 20817-5700 USA
Tel: 301-227-0011 / Fax: 301-227-5442
joel.park@navy.mil

Member
IMECE2010 FED Representative
FEDSM2011 Conference Chair
David W. Halt, D. Sc.
Senior Technical Fellow/Senior Manager
North America CAD/CAE
Visteon Climate Systems
One Village Center Drive
Van Buren Township, MI 48111-5711
Tel.: 734-710-2072
dhalt@visteon.com

Secretary
FEDSM2009 Technical Program Chair
IMECE2009 FED Representative
FEDSM2010 Conference Chair
Mohammad (Mo) H. Hosni, Ph. D.
Head, Dept. of Mechanical & Nuclear Engng.
3002 Rathbone Hall
Kansas State University
Manhattan, KS 66506-5205 USA
Tel.: 785-532-2321 / Fax: 785-532-7057
hosni@ksu.edu

Past Chair
George Papadopoulos, Ph.D.
Manager, Advanced Concepts Group
Alliant Techsystems Inc. (ATK)
Propulsion and Controls Division
77 Raynor Avenue
Ronkonkoma, NY 11779-6649 USA
Tel: 631-737-6100 x195
Cell: 631-456-2271 / Fax: 631-737-6121
George.Papadopoulos@ATK.com

ASME
Lee A. Hawkins
Senior Program Manager
Global, Technical & Affinity Communities
1710 Audrey Drive
Gerland, TX 75040
Tel: 1.972.414.3260 / Fax: 1.972.414.3268
HawkinsL@asme.org

Jacinta McComie-Cates
Administrator, Knowledge & Community
Three Park Avenue, M/S 23W2
New York, NY 10016
Tel: 212-591-7052 / Fax: 212-591-7671
mccomiej@asme.org

FED Technical Committee Chairs and Vice Chairs 2008–2010

Fluid Mechanics Technical Committee (FMTC)
Chair:
Francine Battaglia, Ph.D.
Associate Professor
Department of Mechanical Engineering
107 Randolph Hall
Virginia Polytechnic Institute & State University
Blacksburg, VA 24061 USA
Tel.: 540-231-0077 / Fax: 540-231-9100
fbattaglia@vt.edu

Vice Chair:
Javid Bayandor, Ph.D.
Associate Professor
The Sir Lawrence Wackett Aerospace Centre
School of Aerospace, Mechanical, and Manufacturing Engineering
Royal Melbourne Institute of Technology
GPO Box 2476V, Melbourne
VIC 3001, Australia
Tel.: +(61) 411-154-854
Office Email: javid.bayandor@rmit.edu.au
Personal: bayandorj@asme.org

Multiphase Flow Technical Committee (MFTC)
Chair:
Malcolm J. Andrews, Ph.D.
National Security Fellow
P.O. Box 1663
Mail Stop D413
Los Alamos National Laboratory
Los Alamos, NM 87545 USA
Tel: 505-606-1430
mandrews@lanl.gov

Vice Chair:
Mark R. Duignan, PhD
Fellow Engineer
Savannah River National Laboratory
Savannah River Nuclear Solutions, LLC
Building 786-5A
Aiken, South Carolina 29808
Tel: 803-725-8256 / Fax: 803-725-2956
mark.duignan@srnl.doe.gov

Fluid Applications and Systems Technical Committee (FASTC)
Chair:
S. A. Sherif, Ph.D.
Assistant Director, Industrial Assessment Ctr.
Founding Director, Wayne K. and Lyla L. Masur HVAC Laboratory
Dept. of Mechanical & Aerospace Engineering
University of Florida
232 MAE Bldg. B, P. O. Box 116300
Gainesville, FL 32611-6300 USA
Tel: 352-392-7821 / Fax: 352-392-1071
sasherif@ufl.edu

Vice Chair:
D. Keith Walters, Ph.D.
Assistant Professor
Department of Mechanical Engineering
Mississippi State University
P.O. Box ME
Mississippi State, MS 39762
Tel.: 662-325-8231 / Fax: 662-325-7223
walters@simcenter.msstate.edu

Micro and Nano Fluid Dynamics Technical Committee (MNFDTC)
Chair:
Kendra V. Sharp, Ph. D.
Associate Professor of Mechanical Engineering
Pennsylvania State University
157D Hammond Building
University Park, PA 16802 USA
Tel.: 814-865-4292 / Fax: 814-863-7222
Email: ksharp@mne.psu.edu

Vice Chair:
Prashanta Dutta, Ph. D.
Associate Professor
School of Mechanical and Materials Engineering
Washington State University
Pullman, WA 99164-2920 USA
Tel.: 509-335-7989 / Fax: 509-335-4662
Email: dutta@mail.wsu.edu

Computational Fluid Dynamics Technical Committee (CFDTC)
Chair:
Richard W. Johnson, Ph.D.
Idaho National Laboratory
M.S. 3855
P.O. Box 1625
Idaho Falls, ID 83415-3855 USA
Tel.: 208-526-0955
Rich.Johnson@inl.gov

Vice Chair:
Zhongquan (Charlie) Zheng, Ph. D.
Associate Professor
Mechanical and Nuclear Engineering Dept.
3039 Rathbone Hall
Kansas Sate University
Manhattan, KS 66506-5610 USA
Tel.: 785-532-6132
zzheng@ksu.edu

Fluid Measurements and Instrumentation Technical Committee (FMITC)
Chair:
Theodore (Ted) J. Heindel, Ph.D.
Professor
Department of Mechanical Engineering
2026 H.M. Black Engineering Building
Iowa State University
Ames, IA 50011-2161 USA
Tel.: 515-294-0057 / Fax: 515-294-3261
theindel@iastate.edu

Vice Chair:
Pavlos Vlachos, Ph.D.
Assistant Professor
Mechanical Engineering
114S Randolph Hall
Blacksburg, VA 24061 USA
Tel.: 540-231-3366 / FAX: 540-231-9100
pvlachos@vt.edu

Administrative Committees 2008–2009

Honors & Awards
Adiel Guinzburg, Ph.D.
The Boeing Company
Mail-code: 14-29
7755 E Marginal Way South
Tukwila, WA 98108
Tel: 206-544-8169 / Fax: 206-544-1195
Mobile: 310-429-3665
adiel@alumni.caltech.edu

Membership
Richard R. Schultz
Idaho National Engrg Lab
MS 3895 PO Box 1625
Idaho Falls, ID 83415-0001
Tel: 208-526-9508 / Fax: 208-526-6971
srr@inel.gov

Newsletter Editor
James C. Meng, Ph.D.
Warfare Systems Engineering
Naval Sea Systems Command
US Navy
1333 Isaac Hull Ave SE,
Washington Navy Yard,
Washington, DC 20376-2001
Phone: 202 781 1366
James.c.meng@navy.mil

Professional Development
Philip A. Pfund, Ph.D.
Fermilab
PO Box 500 MS 343
Batavia, IL 60510-0500
Tel: 630-840-4784 / Fax: 630-840-8032
pfund@cannet.com

Journal of Fluids Engineering Technical Editor
Joseph Katz, Ph.D.
Johns Hopkins Univ
122 Latrobe Hall
3400 N Charles St
Baltimore, MD 21218-2680
Tel: 410-516-5470 / Fax: 410-516-7254
katz@jhu.edu

Webmaster
Ayodeji Demuren, Ph.D.
Old Dominion University
Dept. of Mechanical Engineering
Norfolk, VA 23529
Tel: 757-683-6363 / Fax: 757-683-5344
ademuren@odu.edu

Advisory Board Chair
Christopher J. Freitas, Ph.D. Computational Fluid Dynamics
Department of Engineering Dynamics
Southwest Research Institute
San Antonio, Texas
Tel: 210-522-2137 / Fax: 210-522-6290
cfreitas@swri.edu

Communications Committee
George Papadopoulos, Ph.D.
Dantec Dynamics Inc.
777 Corporate Drive
Mahwah, NJ 07439
Tel: (201) 512-0037 Ext.121
Fax: (201) 512-0120
george.papadopoulos@dantecdynamics.com

Professional Development Committee Chair
Philip A. Pfund
Fermilab
P. O. Box 500 MS-343
Batavia, IL 60510-0500
Tel: 630-840-4784 / Fax: 630-840-8032
pfund@cannet.com

Publications Committee
Joseph Katz
Journal of Fluids Engineering
Department of Mechanical Engineering
The Johns Hopkins University
3400 North Charles Street
Baltimore, MD 21218-2686
katz@jhu.edu

Industry Relations Committee Chair
David Halt
DSc Visteon Climate Control Systems
45000 Helm St.
Plymouth, MI 48170
Tel: 734-451-9181 / Fax: 734-416-6908
dhalt@visteon.com

Government Relations Committee Chair
Richard S. Meyer, Ph.D.
Fluids Research Department Applied Research Laboratory
The Pennsylvania State University
State College, PA
Tel: (814) 865-1741
richardmeyer@psu.edu

Fluids Engineering Honors and Awards Committee 2007–2009

Chair
Adiel Guinzburg, Ph.D.
The Boeing Company
Mail-code: 14-29
7755 E Marginal Way South
Tukwila, WA 98108
Tel: 206-544-8169 / Fax: 206-544-1195
Mobile: 310-429-3665
adiel@alumni.caltech.edu

Member 2006-2009
Judith Ann Bamberger, PE
Pacific Northwest National Laboratory, K7-15
PO Box 999
Richland, WA 99352
Tel: 509 375-3898 / Fax: 509 375-3641
judith.bamberger@pnl.gov

Member 2006-2009
C. Channy Wong
Sandia National Laboratories
Mail Stop 0826, Department 1513 Microscale Science & Tech Dept.
P.O. Box 5800
Albuquerque, New Mexico 87185-0826, USA
Tel: +1 505 844 3530 / Fax: +1 505 844 4523
ccwong@sandia.gov

Member 2006-2009
Ismail B. Celik, Ph.D.
Mechanical and Aerospace Engineering Department West Virginia University
Morgantown, WV 26506-6106
Tel: (304) 293 3111 ext. 2325
Fax: (304) 293 6689 (fax)
Ismail.Celik@mail.wvu.edu

Member 2006-2009
Grétar Tryggvason, Ph.D
Dept of Mechanical Engineering
100 Institute Road
Worcester Polytechnic Institute
Worcester, MA 01609-2280
Tel: 508-831-5759 / Fax: 508 831-5680
gretar@wpi.edu

Member 2009-2012
Dr. Yu-Tai Lee [FASTC]- 2009-2012
David Taylor Model Basin
Naval Surface Warfare Center
Carderock Division
West Bethesda, MD 20817
Tel: (301) 227-1328 / Fax: (301) 227-3585
yu.lee@navy.mil

Freeman Scholar Standing Committee 2008–2010

Chair
Stathis Michaelides
Professor and Chair, Mechanical Engineering
University of Texas at San Antonio
One UTSA Circle
San Antonio TX 78249
stathis.michaelides@utsa.edu

Member
David E. Stock
School of Mechanical Engineering & Material Engineering
Washington State University
Pullman,WA 99164-2920
stock@wsu.edu

Member
Timothy J. O'Hern, Ph.D.
Sandia National Labs 0834
Engineering Services MS
PO Box 5800
Albuquerque, NM 87185-0834
Tel: 505-844-9061 / Fax: 505-844-8251
ohernt@asme.org
tjhoern@sandia.gov