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 David W. Halt, D.Sc.

Dear FED Members,

I am pleased to report another terrific year for our Fluids Engineering Division. Our Summer Fluids Engineering Conference, AJK2011, was held jointly with ASME (American Society of Mechanical Engineering), JSME (Japanese Society of Mechanical Engineering) and KSME (Korean Society of Mechanical Engineering) in Hamamatsu, Japan on July 24–29, 2011. We had over 600 technical papers from 32 countries making this a significant international event in Fluids Engineering. There were six plenary lectures, three luncheon lectures and two luncheon seminars from representative speakers selected by ASME, JSME and KSME. The Conference was organized into 26 symposia, 5 fora and 4 Technical Flash events which were oral presentation only. The Technical Flash is new for this Fluids Engineering Division Summer Meeting (FEDSM).

Every four years, the FEDSM has been held together with JSME starting in 1991. Our previous event was held during 2007 in San Diego with significant participation from Japanese and Korean authors. It was at this time that we decided the 2011 event would be hosted in Japan. During the AJK2011 Conference, it was decided the follow on event in 2015 will be held in Korea. We decided to promote the on-site participation of student authors and supported seven of the ASME student authors who traveled to Hamamatsu and presented a technical paper. The ASME students were each given $1,200 to help defray travel and registration costs for AJK2011.

Before the AJK2011 Conference, student support has been done at the annual IMECE meeting via the Young Engineers Paper (YEP) contest. Prof. Terry Beck has run the YEP session each year which invites undergraduate student authors to submit papers. The papers are judged and the top five are selected to participate in a technical session at the conference. Monetary awards are presented to the student authors with best papers. The EC is now developing plans to expand student author promotion to the annual summer meetings for graduate level students. The idea is to promote student participation and involvement at the two big FED events each year.

Our division had a good showing at IMECE in Denver, CO, Nov 13–17, 2011. The IMECE format encourages interdisciplinary involvement in the organization of tracks and sessions, however, the primary footprint of FED is in Track 11, Fluids and Thermal Systems, organized by Dr. Jinkook Lee. This track had 14 symposia and panels comprising 44 sessions with over 200 technical papers. Next year's IMECE will be in Houston, TX and Prof. Francine Battaglia is the FED track chair.

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Spring 2012 Newsletter

Ramin Rahmani, *Editor*

Report on ASME *Journal of Fluids Engineering*

By Malcolm Andrews, Technical Editor of the JFE

I am pleased to write this report about the progress with the ASME Journal of Fluids Engineering (JFE). I have taken this opportunity to report the progress of the Journal, our current efforts to improve responses to authors, and give some directions on how best to submit articles.

During the course of 2011 it came to our attention that the official Thompson Reuter cite wasn't what most authors had been commonly using. About 1 month ago the ASME checked with Thompson Reuter directly to identify the correct way to cite our journal. The ASME Publishing committee, led by Joe Katz, is working hard with the ASME to have Thompson Reuter expand their cite search to allow for a more accurate impact factor calculation. The correct cite for the Journal of Fluids Engineering is "J Fluids Eng- Trans ASME".

During 2011 the Journal had a total of 502 submissions, of which to date 306 were assigned to Associate Editors after a preliminary review. 105 have been accepted and another 138 are in progress. These statistics compare well with 2010, and indicate that we are on-track to accept about 25% of papers submitted in 2011. Approximately 35% of papers assigned to Associate Editors in 2011 have already been accepted for publication. It is likely that this percentage will rise as the review for the remaining 138 papers are completed.

Moreover, during 2011 we have had a number of Associate Editors finish their terms. Theodore J. Heindel (2005-2011) and James Liburdy (2005-2010) both finished their second term in 2011. In addition Steven Ceccio (2010-2011), Philippe Duport (2008-2011)and Steven T. Wereley (2008-2011) each completed working as Associate Editors for one term. Most Recently Mark Stremler (2009-2012), Dimitris Drikakis(2009-2012), Paul Durbin (2009-2012)and Rajat Mittal(2011-2012) completed their terms on January 1st of 2012. We will miss working with each of these individuals. Individually they brought specialized expertise from their field. Their years of experience and wisdom defiantly enhanced the performance of the journal while they were working as part of the Journal of Fluids Engineering team.

Joining us in January of 2011 year was Mark Duignan from Savannah River National Laboratory and Mark Tachie of the University of Manitoba. In March, we were pleased to have John Abraham join our team from Purdue University. Later this last summer we were pleased to have one of our guest editors Ali Beskok from Old Dominion University agree to become a full fledged Associate Editor. Most recently in October Dr. Mike Olsen from Iowa State University agreed to join our team of Associate Editors. In addition to our new Associate Editors, we are also excited to have Sharaith Girimanji, Krishnan Mahesh, Susha Mitra and Bart Van Esch also joining the team this year working as Guest Editors, and we hope, shortly these individuals will also become full fledged Associate Editors.

As with all fluid systems, the Journal is committed to increase submission, quality, and response to authors. To this end we continue to use a policy of Editor "pre-screening" papers when they are first submitted to give quick feedback about manuscripts that are obviously deficient. Such deficiencies typically include: poor English; formating as a conference publication rather than for the Journal {https://journaltool.asme.org/Help/AuthorHelp/WebHelp/JournalsHelp.htm}; "work-in-progress" rather than completed; "observational" conclusions rather than careful analysis and discussion; and, use of commercial software to create a "report" rather than an archival set of results of value/use to the JFE readership. To help authors with the criteria for use of commercial software the JFE published an article {Andrews,M., "Guidelines for Use of Commercial Software and Diagnostics in Articles for the Journal of Fluids Engineering," *J Fluids Eng–Trans ASME*, vol. 133, iss. 1, pp010201-010202.}, and I strongly encourage authors to review that article for helpful guidance and to pay attention to the ASME requirement on reporting numerical uncertainty {Celik, I.B., Ghia, U., Roache, P.J., Freitas, C.J., Coleman, H., et al, "Procedure for Estimation and Reporting of Uncertainty Due to Discretization in CFD Applications," *J Fluids Eng–Trans ASME*, vol. 130, iss. 7, pp0780011-0780014.}.

Associate Editors are also encouraged to do their own pre-screen, with more technical depth, prior to sending to reviewers, and to let authors (or the editorial office) know of any deficiencies that might significantly impact the likelihood of a successful review. The spirit of these pre-screenings is provide faster feedback to authors, and provide better quality papers for reviewers to consider (our reviewers are some of our future authors).

We also encourage authors, whose conference papers have been ranked "journal quality", to consider extending their paper and submitting to the Journal (after formatting to the Journal requirement). It is my experience that most conference papers report "work-in-progress" and typically need additional results before they become of archival value. So the submission of a conference paper straight to the Journal (after the conference) is likely to be unsuccessful under a pre-screen or review. However, closer coupling of conferences to the Journal prove beneficial to both.

One last significant change concerns excess page charges, these charges are not currently being assessed, but the (substantial) color print charges will remain. Thus, the previous limit of 9 journal pages is not currently in effect, but authors should be careful of excessively long papers where readers might lose interest.

I close by thanking my editorial board of Associate Editors and the editorialoffice for all their hard work. Please feel free to contact the editorial office at JFE.EditorialOffice@gmail.com if you have any questions. If you see me at a conference please do not hesitate to visit. ■

Best regards,
Malcolm Andrews
Technical Editor
ASME *Journal of Fluids Engineering*

Chair's Message

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Our next Summer Meeting will be held in Puerto Rico, July 8–12, 2012. Dr. Jinkook Lee is the FEDSM Chair. This Conference will be held jointly with the Heat Transfer Division's (HTD) Summer Heat Transfer Conference. Furthermore, a third Conference is simultaneously held, The International Conference on Microchannels, Nanochannels and Minichannels (ICNMM), which is sponsored by FED. The current organization of the annual ICNMM is sponsored on even years by FED and on odd years by HTD. In 2013, the FEDSM will be held in Lake Tahoe, NV and Prof. Francine Battaglia will be the Conference Chair. This Conference will not be held simultaneously with other conferences making it a smaller but dedicated Summer Fluids Meeting in the resort community of Incline Village.

The Journal of Fluids Engineering (JFE) continues to grow, thanks to the leadership of Dr. Malcolm Andrews and his talented staff of Associate Editors (AE). The continued success of JFE helps to contribute financially to the FED budget. Dr. Andrews has tackled the issue of how to improve JFE's impact factor and we are looking forwards to positive results over time.

The Journal of Nanotechnology in Engineering and Medicine is co-sponsored by FED along with several other divisions. FED has been active in promoting this Journal along with 4 other divisions. FED recommended Prof Boris Khusid to his current position as the interim Technical Editor until 2012. Also, Dr. Joe Katz, former JFE Technical Editor, is serving as the chair of the advisory committee overseeing this journal.

The FED is grateful for the help of dedicated ASME staff. Many thanks go to Nhora Cortes-Comerer and Stacey Cooper in Publications. Also thanks to Erin Dolan, FEDSM and IMECE events manager, along with Lee Hawkins, Senior Program Manager and Jacinta McComie Cates, Administrator.

We encourage involvement by all members in the Technical Committees (TC) of FED. It is the volunteer efforts from our many Technical Committee (TC) members that are instrumental in making our conferences a success. Thank you for your support. ■

Best regards,
David Halt, DSc
Executive Committee Chair
Fluids Engineering Division

FED Technical Committee Reports

Fluid Applications and Systems Technical Committee (FASTC)

D. Keith Walters, Chair
Wayne Strasser, Vice-Chair

The mission of the Fluids Applications and Systems Technical Committee (FASTC) is to promote the advancement and dissemination of fluids engineering research and technology in several wide-ranging single-and multi-disciplinary topic areas. These include such traditional disciplines as fluid power systems, turbomachinery, automotive flows, and industrial fluid mechanics, and can include less traditional topics such as environmental engineering, geophysical flows, extra-terrestrial physics, chemical processing, alternative energy systems, 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.

We will sponsor two recurring symposia at the Fluids Engineering Summer Meetingin Puerto Rico, USA, July8-12, 2012. These include the 24rd Symposium on Fluid Machinery and the 19th Symposium on Industrial and Environmental Applications in Fluid Mechanics. In addition, FASTC will co-sponsor the Symposium on Issues and Perspectives in Ground Vehicle Flows, and 13th International Symposium on Advances in Numerical Modeling for Turbomachinery Flow Optimization. For the 2012Joint FED/HTD IMECE meeting in Houston, TX, USA, November 9-15, FASTC will sponsor the 21th Symposium on Industrial Flows and co-sponsor the Symposium on Wind Turbines Aero and Control.

We were pleased to have new members attend the FASTC meetings at FEDSM and IMECE in 2011.We continue to encourage all interested individuals from academia and industry to participate in the FASTC activities, and especially to attend our symposia and technical committee 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, Keith Walters at Mississippi State University (walters@me.msstate.edu) or the Vice Chair, Wayne Strasser at Eastman Chemical Company (strasser@eastman.com). ■

Micro- and Nano-Scale Fluid Dynamics Technical Committee (MNFDTC)

Prashanta Dutta, Chair
David Sinton, Vice-Chair

It was another great year for micro- and nano-scale fluid dynamics at the IMECE. This year the micro/nano fluid dynamics sessions had a total of 46 talks with 18 papers/talks presented in Track 5-3 and 28 papers/talks presented in Track 10-11. The sessions were well attended and there was excellent discussion following the talks. This year the symposium was also able to attract a number of papers/talks outside of USA. The 2011 Microfluidics forum was organized by Chang-Hwan Choi of Stevens Institute of Technology, with help from Jiang Zhe of University of Akron, and Peter Huang of Binghamton University. Jiang Zhe is taking the lead for 2012, with help from Iskander Akhatov of North Dakota State University. Chang-Hwan is assisting Jiang and Iskander with the online review system.

Invited talks are an important part of the IMECE meeting, and this past year the Forum attracted outstanding researchers Prof. Luke P. Lee from University of California, Berkeley and Prof. Todd Squires from University of California, Santa Barbara to the event. Dr. Luke Lee is a world-leading researcher in bionanoscience, molecular diagnos-

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tics, and preventive personalized medicine, and he gave a talk on "Bionanoscience for Innovative Global Healthcare Research & Technology (BIGHEART)". Dr. Todd Squires is an established expert in microfluidics. Todd gave a talk on "Nonlinear Electrokinetics in Microfluidic Systems: Fundamentals and Applications". Both researchers gave an interesting and engaging talk and participated in discussions and networking. These speakers were brought in by the keynote committee of Kendra Sharp, Prashanta Dutta and David Sinton. This coming years' invited talks will be organized by Drs Shaurya Prakash, Nazmul Islam, and Prashanta Dutta.

The Microfluidics social event was scheduled the same time as the FED Division Reception meeting, in the Hyatt Regency Hotel. The social was well attended by students, faculty, and engineers from industry and was a great chance for attendees to meet and network in a relaxed setting. As the response was very positive, the committee will keep this function to future events.

The Microfluidics forum also has two awards: a Best Paper Award and a Best Student Presentation Award. D. S. Park, S. King, K. E. Thompson, C. S. Willson, and D. E. Nikitopoulos, all form Louisiana State University were awarded the Best Paper Award for their work on the "Flow Visualization in Artificial Porous Media from Microfluidic PMMA Devices". Navdeep Dhillon was awarded the Best Student Presentation Award. To select the best presentations and papers, feedback from session chairs was collected and compiled by the awards committee including David Sinton, Prashanta Dutta and Kendra Sharp.

The Micro/Nano Society-wide Poster Forum was also a success this year and attended by many Microfluidics Forum participants. This forum, organized by Daniel Attinger, has become an important part of the conference experience for the Micro/Nano community. The Micro nano fluid dynamics technical committee met on November 16, 2012 (Wednesday), and approved the bylaws for this technical committee along with many other routine activities such as formation of subcommittees for the upcoming year.

In 2012, the IMECE will be held in Houston, Texas, and the organizers are currently processing the papers and sessions for this event. The Micro and Nano Fluid Dynamics Technical Committee is looking forward to the meeting and broadening the impact of the division. The technical committee will elect a new co-chair during the Micro and Nano Fluid Dynamics technical committee meeting at the 2012 IMECE, and the executive committee is soliciting nominations for that. Please contact Dr. Prashanta Dutta (prashanta@wsu.edu) or Dr. David Sinton (sinton@mie.utoronto.ca) if you are interested for the co-chair position of this technical committee.

This year the Fluids Engineering Summer Meeting is being jointly sponsored with ASME Heat Transfer Meeting and the International Conference on Nanochannels, Microchannels, and Minichannels in Puerto Rico, USA. A number of the MNFDTC committee members are participating either by organizing sessions or presenting oral or poster submissions.

Respectfully submitted by Chang-Hwan Choi, Jiang Zhe, David Sinton (MNFDTC co-chair), and Prashanta Dutta (MNFDTC Chair). ■

Multiphase Flow Technical Committee (MFTC)

Mark R. Duignan, Chair

Timothy J. O'Hern, Vice-Chair

To better understand cavitation the ASME Cavitation Committee was formed in 1937, which has since evolved to, and is currently known as, the Multiphase Flow Technical Committee (MFTC). There is still a strong need to understand the formation of pressure-induced bubbles and the destructive force caused by bubble collapse, but in the 21st century the field of multiphase, or multicomponent, flow is much larger and more diverse, which you can learn about in the two special sessions on the history of the committee to be given during FEDSM2012 and described below.

The MFTC is made up of a group of engineers, scientists, and especially young professionals interested in advancing knowledge in all aspects of multiphase flow. Because the area is so broad it touches many other disciplines, including Heat Transfer, Acoustics, Manufacturing, Combustion, Bioengineering, and Micro/Nano-Electromechanical systems, to name a few. Our main vehicle to bring the multiphase community together is to create, sponsor, and organize symposia and fora at engineering conferences: the International Mechanical Engineering Congress & Exposition (IMECE) and the Fluids Engineering Division (FED) Summer Meeting (FEDSM). The latter is the principal venue for MFTC activities.

This year is shaping up to be a very exciting one for the MFTC. The summer meeting, FEDSM2012, which is sponsored by our division, will be part of the ASME2012 Heat Transfer, Fluids Engineering, & Nanochannels, Microchannels, and Minichannels Conferences (HTFNMM2012). It will be in Rio Grande, Puerto Rico, USA, July 8-12 [see http://www.asmeconferences.org/HTFNMM2012/].

In 2012 the MFTC is celebrating its 75th year of existence! This important occasion will be highlighted at FEDSM2012. Past Chair Dr. Bill Morgan will present a plenary lecture to summarize the history of the MFTC, specifically, and FED in general. There will also be a special session highlighting some key multiphase research done during the past 8 decades presented by 8 past MFTC chairs. Furthermore, during the last 12 months the MFTC lost two past chairs, Drs. Clayton T. Crowe (17th chair: 1984-1986) and J. William (Bill) Holl (6th chair: 1962-1964). The special session will be dedicated to both of these giants in the multiphase flow field.

Besides these special events, the MFTC will also sponsor 2 symposia and 3 fora:

- 12th International Symposium on Numerical Methods for Multiphase Flow
- Symposium on Non-Invasive Measurements in Single and Multiphase Flows (co-sponsored with FMITC)
- 47th Cavitation and Multiphase flow Forum
- 4th Forum on Biological Flows
- Open Forum on Multiphase Flows: Work in Progress

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Finally, the MFTC will be also active at IMECE2012 in Houston, Texas, Nov. 9-15 [see http://www.asmeconferences.org/Congress2012/] to include sponsoring the 8th Forum on Recent Developments in Multiphase Flow.

Come join us in 2012 and 2013 as we are always pleased to welcome new and active members. Please feel free to contact the chair, Mark Duignan at mark.duignan@srnl.doe.gov or the vice-chair, Tim O'Hern at tjohern@sandia.gov. ■

Computational Fluid Dynamics Technical Committee (CFDTC)

Zhongquan (Charlie) Zheng, Chair

Raymond Gordnier, Vice-Chair

The focus of the CFDTC is the field of computational fluid dynamics and related areas. The overall objective of the CFDTC is to develop, promote, coordinate and disseminate information relating to the successful and accurate application of CFD to problems of interest and importance to the research community as well as to industrial users and other practitioners. Membership is open to anyone who is interested in participating in the activities of the CFDTC.

The CFDTC usually meets two times a year: one at the summer FED meeting and the other at the IMECE meeting.

At the summer FED meeting, the CFDTC sponsors 6 symposia in the summer meeting: Symposium on Applications in CFD, Symposium on Development and Applications of Immersed Boundary Methods, Symposium on CFD Verification and Validation (co-sponsor), Symposium on Algorithm Development in CFD, International Symposium on Fluid-Structure Interaction and Flow-Induced Noise in Industrial Applications, and Symposium on DNS, LES, and Hybrid RANS/LES Methods.

At the IMECE meeting, the CFDTC currently sponsors 1 forum and one panel: Forum on CFD Algorithms and Applications for Flow Optimization and Controls, and Panel on CFD/EFD Dilemma (co-sponsor). The Forum and Panel are intended for widening the participation of the CFDTC and cultivating the inter-disciplinary interactions between the CFDTC and the other disciplines at the IMECE.

We welcome you to be part of the CFDTC, by coming to our TC meetings, presenting at our symposiums, or volunteering in whatever ways. If you have questions, comments, or suggestions, please feel free to contact the CFDTC Chair Z. Charlie Zheng (zzheng@ku.edu) or Vice Chair Raymond Gordnier (Raymond.gordnier@wpafb.af.mil). ■

Fluid Measurements and Instrumentation Technical Committee (FMITC)

Pavlos Vlachos, Chair

Hui Hu, Vice Chair

The mission of the Fluid Measurement and Instrumentation Technical Committee (FMITC) is to provide a venue for the Fluids Engineering Division (FED) to focus on measurement and instrumentation issues relevant to fluid flows. Modern fluids engineering embraces a complex spectrum of problems from the relatively simple case of isothermal, incompressible, single phase flow of Newtonian fluids to non-Newtonian multiphase flows with heat and mass transfer from the nanoscale to the macroscale. Experimental measurements and instrumentation are required in all cases to verify new theories, to certify the performance of fluid machinery, or to obtain fundamental information on processes to guide and validate the development of analytical and numerical models.

The FMITC was originally organized under the Coordinating Group for Fluid Measurements (CGFM) for the purpose to foster technical and professional development activities in the area of fluid measurements in both laboratory and field measurements. FMITC is responsible to organize, promote, and present symposia, forums, and panel discussions on fluid measurements. The committee meetings of FMITC are held twice a year at the IMECE and the FED Summer Meeting. The time and date of these meetings are announced in the conference program.

FMITC will organize following symposium and forums as an integral part of ASME 2012 Fluids Engineering Division Summer Meeting will be held on July 8-12, 2012 at Puerto Rico, USA:

- Forum on Flow Measurement Uncertainty
- Forum on Fluid Measurements and Instrumentation
- Symposium on Non-Invasive Measurements in Single and Multiphase Flow

Further information about the symposium and forums is available at http://www.asmeconferences.org/FEDSM2012/

FMITC will also be active at IMECE2012 to be held on Nov. 9-15, 2012 at Houston, Texas to organize or co-sponsor following forums and symposium:

- Fluid Measurements and Instrumentation
- Noninvasive Measurements in Single and Multiphase Flows

Further information about the symposiums and forums is available at http://www.asmeconferences.org/Congress2012/index.cfm

The membership of FMITC is open to all professionals from Academia, Government, Industry and Private Sector interested in fluid measurement and instrumentation. If you are interested in joining FMITC or receiving announcements and/or notification of FMITC sponsored meetings and symposiums, please write to the FMITC chair, Professor Pavlos Vlachos at pvlachos@vt.edu or the vice chair, Prof. Hui Hu at huhui@iastate.edu. ■

Fluid Mechanics Technical Committee (FMTC)

Javid Bayandor, Chair

Kamran Sidiqqui, Vice-Chair

The Fluid Mechanics Technical Committee (FMTC) is one of the six Technical Com-

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mittees (TCs) of the ASME Fluids Engineering Division with the principle responsibility of promoting fundamental and applied fluid mechanics related professional activities within the Division and the Society. The Committee has a membership of over 60, charged with planning, promoting, organizing, and running symposia with their associated keynote talks, and panel discussions on topics of importance to the fluid mechanics community. These activities are run annually in conjunction with the Fluids Engineering Division Summer Meeting (FEDSM) and the International Mechanical Engineering Congress and Exposition (IMECE). In 2012, the Committee will hold eleven symposia during the Summer Meeting in Puerto Rico and four symposia during IMECE in Huston.

FMTC together with the Division's Executive Committee and the other TCs help nominate a number of renowned Fluids Engineering experts from academia and industry to present plenary talks during each FEDSM event. The plenary talks are intended to provide a more comprehensive account of the state of the art and science in one or more areas of fluid engineering.

During the 2011 Joint ASME, JSME and KSME Summer Meeting in Hamamatsu, Japan, FMTC had the pleasure of hosting Professor James Riley, Professor of Mechanical Engineering and Applied Mathematics from the University of Washington. Professor Riley's plenary talk titled "Some Fluid Dynamical Issues in the Siting of Turbines for Tidal Energy". He began his talk by discussing the importance of the tidal energy as a source of renewable energy in several areas of the world. It was indicated that in the northwestern United States, the Puget Sound, especially Admiralty Inlet in the northern part of the Sound, was a promising source of tidal energy. Professor Riley then continued by highlighting the ongoing efforts by the Northwest National Marine Renewable Energy Center of the University of Washington in partnership with the Oregon State University to explore the potential for tidal energy in the Puget Sound. The studies undertaken within the Center range from field experiments to help characterize the potential of specific sites, to studies of the effects of water turbines on marine mammals, to the work addressing the reliability and survivability of turbine devices through the use of advanced composite materials. Professor Riley further discussed the use of the Regional Ocean Modeling System (ROMS), a community-developed ocean computer model, during the ongoing studies. It was explained how, through employing ROMS, the researchers were performing high resolution, "nested" simulations of the candidate areas for tidal energy.

Professor Riley's plenary talk continued by emphasizing on two related aspects of the studies undertaken within the Center: the first was the detailed dynamics of the flow observed within the region of interest, including the behavior of the tides, but also secondary motions such as vortices generated by the headlands, flow enhancements due to various features in the bathymetry, and the potential for hydraulic control as current speeds approached the local internal interfacial wave speed. The second aspect comprised of various metrics used to determine the effectiveness of local flows for tidal energy exploration purposes. Some of the metrics indicated in the talk included the local kinetic power density, asymmetry in flow direction, and various turbulence properties.

As reported last year, based on the request made by the Executive Committee, FMTC has had the opportunity to revisit its By-Laws, which were last amended in 2000. The Executive Committee has now completed their revision of the FMTC 2011 draft by-laws with relevant addendums on the terms of office, election procedures, and other committee responsibilities. The revised FMTC by-laws, together with those of the other five TCs and the Executive Committee have been reformatted for consistency across the Division and are now awaiting endorsement and final approval from the Society.

In the last FMTC meeting held during IMECE 2011 in Denver, CO, discussions were initiated by the FMTC Chair and supported by the FED EC Chair concerning the introduction of additional incentives to increase student involvement in FED activities. In particular, increased participation in FEDSM and membership in the FED TCs were noted. It was also suggested that the selection process for the FED Executive Committee student initiative may be formalized. The initiative entails the award of several scholarships for graduate students to attend FEDSM events. The Executive Committee considered the FMTC recommendations for enhancing student participation and has recently approved the establishment of a committee overseeing graduate student initiatives, under the banner of Graduate Student Steering Committee (GSSC). A formal proposal, in relation to the formation of GSSC, has been submitted to the Executive Committee by FMTC, discussed and is currently pending approval. It is expected that the GSSC will become operational by the end of 2012 and an integral part of the Division by FEDSM 2013.

The next round of officer election for FMTC will be held during FEDSM 2012 in Puerto Rico in July this year. Having worked as the Chair and Vice-Chair of the FMTC, respectively, since August 2010, Professors Javid Bayandor from Virginia Tech, and Kamran Siddiqui from the University of Western Ontario will complete their first term in office. Nominations are accepted for both positions through the FMTC Chair.

In FMTC, we encourage and welcome involvement and membership from all professional sectors, including graduate students, with interest in fluids engineering. Our aim is to grow relevant professional activities that can consequently contribute to the advancement of the field. Achieving our mission so far would have not been possible without the help and selfless devotion of our membership, as well as the valuable technical contributions made by the members of the fluids community at large. We would therefore like to renew our invitation to you to join our Committee to help shape a bright future for a field with strong foundations that has been at the service of the community for many centuries. Please feel free to come join us during either or both of our bi-annual committee meetings at FEDSM or IMECE.

On a final note, as the Chair and Vice-Chair of the Committee, it has been a great privilege and an honor for us to serve the Division and the professional community. Please contact us at bayandor@vt.edu (Javid Bayandor) or ksiddiqui@eng.uwo.ca (Kamran Siddiqui) with your questions or comments concerning FMTC. ■

Advisory Council

By Joel T. Park, Ph. D., Chair

The new FED Bylaws have been updated with a more formal structure of the Advisory Council. With the new organization, the outgoing member of the Executive Committee becomes the Chair for one year. The mission of the Advisory Council is to provide advice to the Executive Committee at regularly scheduled meetings of the Executive Committee. The membership of the Council consists of former Chairs of the Executive Committee and other senior members of the FED. The Council under the new Bylaws met at IMECE2011 in Denver. A contact list of former Chairs was constructed from the ASME FED membership list and others. The total number of former Chairs was 44, who are active members of ASME.

For IMECE2011, an invitation and agenda were sent those with an email address. A number responded with regrets. More detailed responses about their current activities were received from Charles Dalton of the University of Houston (Chair 1986-87) and Richard (Dick) Bajura of the University of West Virginia (1992-93). Those in attendance were Timothy (Tim) J. O'Hern of Sandia National Laboratory (2001-02), Urmila Ghia of the University of Cincinnati (2006-07), and Karman N. Ghia of the University of Cincinnati. One topic of discussion was awards. In particular, the Fluids Engineering Award should be increased. Karman is a member of the ASME Committee on Honors and can provide advice on new awards. Tim suggested continuation of tutorials and workshops at conferences, which have been absent in recent years.

In addition to advice, the Advisory Council can support special projects. FED has an informal committee on the history of FED. The committee consists of William (Bill) B. Morgan (1981-82), Paul Cooper (1985-86), and C. Samuel (Sam) Martin (1980-81). Bill wrote a review of FED history in the 2010 Spring Newsletter.

With great sadness, deaths of two former chairs are reported since the last Newsletter. John William (Bill) Holl of Pennsylvania State University (1967-68) died May 25, 2011. Until his death, Bill was apparently the earliest living Chair. Clayton T. Crowe of Washington State University (1990-91) died February 5, 2012. In one of his last activities with FED, Clay was a plenary speaker at FEDSM2009 in Vail, Colorado. His address was documented as a full-length conference paper, ASME FEDSM2009-78093 "Carrier Phase Turbulence in Fluid-Particle Flows." ■

FED Awards

Honors and Awards Committee

The Honors and Awards Committee consists of past technical committee chairs. The 2012 Committee members include Professor Khaled J. Hammad (FMTC) of Central Connecticut State University, Professor Deborah V. Pence (MNFDTC) of Organ State University, Professor Theodore J. Heindel (FMITC) of Iowa State University, Dr. Miguel Visbal (CFDTC) of Air Force Research Laboratory, Professor S. Balachandar (MFTC) of University of Florida, and the Committee Chair Dr. Yu-Tai Lee (FASTC) of Naval Surface Warfare Center, Carderock Division. Detailed descriptions of the ASME Society and FED Division Awards presented by the Honors and Awards Committee can be found at http://divisions.asme.org/fed/Honors_Awards.cfm. The following is a brief description of the awards offered and the 2011 recipients.

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 2011 Fluids Engineering Award was **Dr. John F. Foss**. He is a professor in the Mechanical Engineering Department of Michigan State University. He obtained his doctorate from Purdue University in 1965. The guiding spirit for his research has been "analytical experimentation," in which one seeks to identify and to utilize the basic phenomena of the subject flow field. This spirit is present in his 82 journal and conference publications, his 13 book chapters and his co-authored textbook. The direct measurement of time resolved vorticity and using these data to infer governing phenomena is a particular example of this spirit. He has been a visiting professor at JHU (1970), University of Karlsruhe (1978), University of Erlangen (1985), and University of Melbourne (1995). He served as an associate editor for AIAA Journal (1982–1985) and Journal of Fluids Engineering (1988–1996), an editor for the Measurement Science & Technology, North American and Special Features/Issues (1996–present), and the program director for the NSF Fluid Dynamics and Hydraulics (1998–2000).

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 2010 Knapp Award was presented to Jiarong Hong and Joseph Katz for their paper entitled: "Scale-Dependent Energy Fluxes in a Rough-wall Turbulent Channel Flow," (FEDSM ICNMM2010-30829). **Jiarong Hong** received his bachelor's degree in engineering from the University of Science and Technology of China in 2005, and is currently a PhD student in mechanical engineering at Johns Hopkins University. His research includes turbulent flows over rough surfaces, sponsored by the Office of Naval Research and the study of marine zooplanktons using digital holography. **Joseph Katz** is the William F. Ward Sr. Distinguished Professor in the Department of Mechanical Engineering at Johns Hopkins University. He received his bachelor's degree from Tel Aviv University and master's degree and PhD from Caltech, all in mechanical engineering. After several years at Purdue University, he joined Johns Hopkins University in 1988. He is a fellow of ASME and of the American Physical Society (APS). He served as the technical editor of the Journal of Fluids Engineering, and is currently the chair of the Board of Transactions Editors of ASME. Katz has advised numerous graduate students and post-docs, most of

(continued on page 8)

FED Awards: (continued from page 7)

whom currently hold academic, industrial and government research positions around the world. He has received several awards including the 2004 ASME Fluids Engineering Award and several best paper awards. His research focuses on experimental fluid mechanics and development of advanced diagnostics techniques for laboratory and field applications. His research groups have studied laboratory and oceanic boundary layers, flows in turbomachines, flow induced vibrations, swimming behavior of marine plankton in the laboratory and in the ocean, as well as cavitation, bubble and droplet dynamics. He has coauthored more than 280 journal and conference papers. **Mike Schultz** received his PhD in ocean engineering from Florida Institute of Technology in 1998. For the past 11 years, he has been a faculty member at the United States Naval Academy (USNA) in Annapolis, Maryland, where he is currently professor and program director of Ocean Engineering. His research interests include experimental fluid dynamics, turbulence, and biofouling. Schultz has published 40 journal papers in these areas. His research has been supported by the Office of Naval Research since his arrival at the USNA. In 2004, he received the R.T. Knapp Award from ASME for the most outstanding research paper in fluid dynamics. In 2006, he received the Raouf Award from the Division of Engineering & Weapons at USNA for teaching excellence in engineering. In the same year, he received the USNA Research Excellence Award sponsored by the Class of 1951. In 2010, Schultz was awarded the USNA Theodore Benac Teaching Excellence Award sponsored by the Class of 1951. He is an active member the ASME, the American Physical Society Division of Fluid Dynamics, and is a registered professional engineer. Mike has also served on the editorial board of Biofouling since 2002.

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 2010 Moody Award was presented to Benjamin H. Timmins, Barton Smith and Pavlos P. Vlachos for their paper entitled "Automatic Particle Image Velocimetry Uncertainty Quantification ," (FEDSM-ICNMM2010-30724). **Benjamin Timmins** was a student at Utah State University (USU) and graduated with a B.S. and M.S. in mechanical engineering and minors in mathematics and chemistry in May 2011. Timmins began researching as a junior in the Experimental Fluid Dynamics Laboratory (EFDL) at USU under the direction of Dr. Barton Smith. At the EFDL, Timmins has worked on aerodynamic vectoring particle sorting and automatic estimation of uncertainty for PIV. Having completed his master's work, Timmins is currently researching photothermal methods for the measurement of material thermal properties in the Thermal/Fluids Laboratory (TFL) at USU under the direction of Dr. Heng Ban. Timmins has received numerous awards and scholarships from USU and the mechanical engineering department including Outstanding Master's Researcher, Academic Excellence, and an Undergraduate Research and Creative Opportunities Grant. In addition to academics and research, Timmins served as the chapter president of the engineering honor society, Tau Beta Pi, and volunteers with Rocky Mountain Hospice. Currently working at the TFL, Timmins is applying to medical school in hopes of beginning in August 2012.

Barton Smith received a BSME from Michigan State University in 1990. He spent the following two years working on nuclear safety for Westinghouse in Pittsburgh. He received an MSME from Georgia Institute of Technology in 1995. Smith performed the seminal work on synthetic jets for his PhD dissertation from Georgia Tech and graduated in 1999. He worked on oscillating flow in support of thermoacoustics at Los Alamos National Laboratory from 2000–2002. He then joined the faculty of Utah State University as an assistant professor and was promoted to associate professor in 2007. **Pavlos Vlachos** received his BS in mechanical engineering from the National Technical University of Athens, Greece, (1995) and his MS (1998) and PhD (2000) in engineering mechanics from Virginia Tech. He joined the Department of Mechanical Engineering at Virginia Tech as assistant professor in 2003 and he was promoted to associate in 2007. He is a member of the Virginia Tech-Wake Forest School of Biomedical Engineering and Sciences and he holds affiliate appointments with the Wake Forest School of Medicine and the Virginia Tech Department of Engineering Science and Mechanics. He has established and directs the Advanced Experimental Thermofluids Research Laboratory. Pavlos Vlachos' research interests extend from traditional experimental fluid mechanics and measurement science, to biomedical engineering and biological flows.

Sankaraiyer 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 award is presented biennially in recognition of outstanding achievement in pump technology, documented through publications and testimonials of peers and coworkers and in keeping with Gopal's dedication to the education of the next generation of expert pump engineers.

Fluids Machinery Design Award

The Award, presented biennially, honors excellence in the design of fluid machinery involving significant fluid mechanics principles, which benefits mankind as exemplified by product use within the past decade.

Freeman Scholar Award

The Freeman Scholar Award is given every two years to an eminent contributor to Fluids Engineering. The Committee selects, based on proposal packets, an expert in an area of current interest who is expected to deliver the Freeman Scholar Lecture during the summer meeting and who will write an extensive review paper that is published in the Journal of Fluids Engineering. The 2012 members of the Freeman Scholar Award committee are Stathis Michaelides of the Texas Christian University, Tim O'Hern of Sandia National Laboratories, and Dave Stock of Washington State University (chair). The 2012 recipient of the Freeman Scholar Award is Professor Pratap Vanka of the University of Illinois, Urbana-Champaign for the paper "Computational Fluid Dynamics on Graphical Processing Units".

The Freeman Scholar Award is biennial and is awarded in even years. Proposals for the 2014 competition will be due on September 2, 2013. More details may be found at: http://www.asme.org/about-asme/hold2/about-asme/honors-awards/freeman-scholar-award. ■

Pulsatile Non-Newtonian Flow in a Three-Stream Coaxial Airblast Injector

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

Introduction

The breakup and atomization of jets has been of direct importance to the agricultural, chemical, food, fire protection, and energy-production industries. The self-sustaining unsteady nature of a three-stream injector has received surprisingly little attention in the open literature even thoughits spray pattern is linked to the energy content of its pulsatile flow. The foundation of the work here is that of Strasser (2010) in which various ratios of gas and liquid feeds were considered with the aim first to characterize and then to optimize the operation of a pulsatile injector. The three streams are designated as inner gas (IG), outer gas (OG) and an intermediate liquid as shown in Fig. 1. Also shown is L_{RI}, the inner retraction length, γ, the outer stream meeting angle, and D_O, the outer diameter. The tuning of the various interfacial driving frequencies creates pervasive gas submergences with five types of pulsation eventsat typical response frequencies of 200 Hz or its multiples. Depending on the relative amount of inner air flow, there seem to be three overall flow regimes.Somewhere near M>0.2 appears to be the transition point, and it shows the largest fluctuations in feed pressures along with changes in the spray pattern.Later Strasser (2011) highlighted interesting geometric effects using the same computational methodology. It was found that inner nozzle retraction has the largest effect on spray pattern and unsteadiness, and trends related to retraction found in the open literature were replicated. All but the highest retracted case exhibited frequencies that were multiples of approximately 200 Hz. In addition, there was a strong coupling between angle and retraction. The time-averaged spray profiles are generally trimodal in shape and were focused or diffused by the geometric permutations.

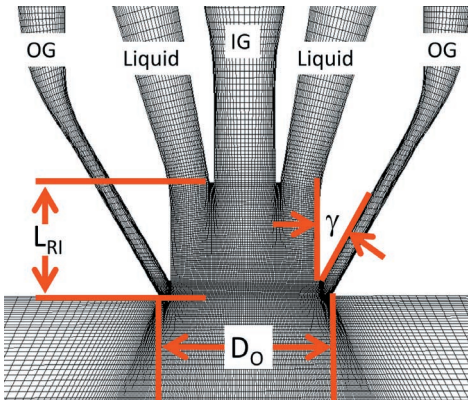

Fig.1: *Three-Stream coaxial airblast injector mesh*

The aim of the present work, however, is to explore the effect of geometric permutations under different injection conditions. Specifically, the gases are changed, and their densities are dramatically increased. Also, the liquid is converted to slurry with a much higher and non-Newtonian viscosity, along with a lower surface tension. The effect of viscosity and surface tension for non-Newtonian fluids on Sauter mean diameter (SMD) has been explored by Aliseda et al. (2008), although their work involved a steady-state two-stream injector system at a much smaller scale and a much higher M. They found that that instability wavelength was substantially affected by higher viscosities. As expected, higher viscosities hindered the growth of instabilities resulting in larger droplets, but only when viscosity was well above ten times that of water. In fact, there was an extremely pronounced coupling effect of surface tension and viscosity. They proposed that the lower surface tension of the non-Newtonian solutions (about one third that of water) prevented their SMD values from being orders of magnitude larger than that of water, instead of just two to three times its value.

Computational Method

The compressible, geometric reconstruction VOF method, validation, turbulence modeling, multiphase approach, numerics, and convergenceare detailed carefully in Strasser (2010). As with any transient numerical simulation, issues surrounding time-averaging the results are critical to the quality of the results. A total of thirteen (13) runswere carried out and provide nine geometry comparisonsshown in Table 1. In addition, prior work air/water equivalent model (AWE)

Table 1: *Injector geometric permutations considered in the present work*

Case	L_{AG}	L_{RI}	L_{RI}/D_O	γ	D_I	D_M	D_O
1	0.85	0.45	0.60	0.60	0.96	0.91	0.95
2	0.85	0.00	0.00	0.60	0.96	0.91	0.95
3	0.85	1.00	1.31	0.60	0.96	0.91	0.95
5	0.85	0.00	0.00	0.20	0.96	0.91	0.95
7	0.85	0.45	0.57	0.60	0.96	0.91	1.00
8	0.85	0.45	0.57	0.60	1.00	1.00	1.00
9	1.00	0.45	0.60	0.60	0.96	0.91	0.95
10	1.00	0.45	0.57	0.60	0.96	1.00	1.00
11	0.85	0.45	0.57	0.60	0.96	1.00	1.00

models are discussed where helpful. Each run took weeks on 4 CPUs. Approximately 14,000 CPU-hours were involved with this work even though everything here involves 2D RANS modeling.The case numbers shown in Table 1 are based on a similar geometry-based numbering system shown in Strasser 2011. The walls of the injector have a much higher temperature (typically > 500°C, but is a function of position) than in the prior AW work. Table 2 summarizes the cases studied in the present work.

The flow rates of the three streams are dictated by the production needs of a very large scale commercial industrial unit. Based on internal testing and dimensional analysis, it is expected that the droplet production processes are in a similar regime between the prior AW work and the current slurry/high-density gas (SH) work. Yet another case is con-

Table 2: *Matrix of cases studied here*

Case	Geo	Solver	IG Flow	IG Feed
A	1	13SP2	Low	Steady
B	1	12.1.2	Low	Steady
C	1	13SP2	Low	Modulated
D	1	13SP2	High	Steady
E	2	13SP2	Low	Steady
F	2	13SP2	High	Steady
G	3	13SP2	Low	Steady
H	5	13SP2	Low	Steady
I	7	13SP2	Low	Steady
J	8	12.1.2	Low	Steady
K	9	12.1.2	Low	Steady
L	10	12.1.2	Low	Steady
M	11	12.1.2	Low	Steady

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Pulsatile Non-Newtonian Flow in a Three-Stream Coaxial Airblast Injector (continued from page 9)

sideredhere in which the IG is modulated at 850 Hz and with a mass flow variation of +/- 50% in a sinusoidal fashion. Notice that geometries 8 – 11 (cases J – M) were studied using Fluent 12.1.2 (due solely to project timing issues), so case B was ran for the purpose of having a direct solver comparison.

Results

Prior works employ a video analysis technique involving automatic frame-by-frame analysis using a program called Labview, in which frame measurements were used to assess the spray character. For that system, the spray pulsed open near the outlet of the injector (Figure 2, top), so the analysis program parameters were based on ligament production near the outlet. For this slurry and high-pressure gas system (Figure 2, bottom), however, the spray does not appear to burst close to the outlet, or produce nearly as many discernible droplets, for any of the geometries or conditions studied.

As a result, a new program was created, in which spray "diameters" will be considered. (This is simply a way of estimating the spreading rate of the bursts, and spray "diameter" should not be confused with any droplet scale measurement.) Presumably, a wider spray would produce smaller droplets. The first diameter is measured at a distance of about 25% of D_O while the second at about D_O from the nozzle outlet. For each diameter, there is an inner (inside edge of the ligaments/droplets) and an outer (outside edge of the ligaments/droplets) as shown in Figure 3.Since we are working in an axisymmetric framework at this stage, all droplets are actually tori, which is why the focus of the various data analysis efforts is, and has been, on ligaments.

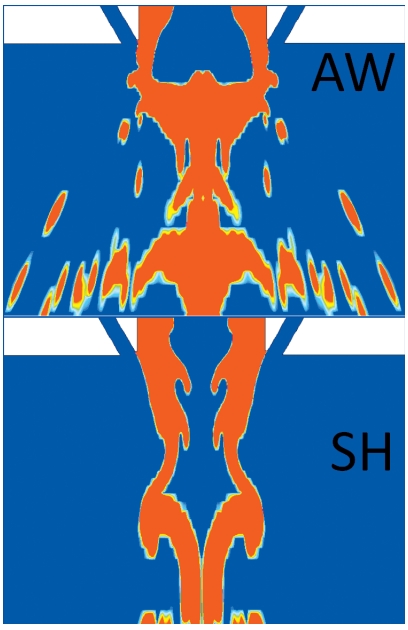

Fig.2: Typical uncorrelated instantaneous liquid volume fraction contours from prior work ("AW") and current work ("Slurry")

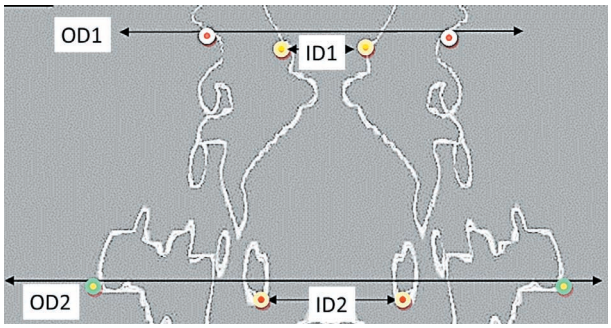

Fig.3: Spray "diameters" considered in the current work.

FFT analyses were carried out on the transient diameter results from Labviewusing Matlab as provided in Table 3. To prevent Matlab from "padding" the data sets with zeros, the largest sample size (in powers of 2) available in the CFD results was used for each set The Coefficient of Variation (COV), which is simply the standard deviation divided by the mean multiplied by 100, is a measure of the fluctuation energy. In all cases, "Tone" refers to the dominant (not necessarily the fundamental) response frequency, while "Magnitude" (the FFT amplitude squared) indicates how focused the frequency spectrum is at the dominant tone. All diameter means are normalized by D_O. A number of interesting findings precipitate from the analysis of these diameters. Primarily, the base geometry under typical conditions shows a dominant tone of around 850, which is why the modulation case "C" uses this driving frequency. It can also be concluded that Fluent 13SP2 is similar to 12.1.2 for this analysis. Modulation producesa mildly increased ID1 and OD1 COV, but not much of a diameter change. As will be seen later, the inner gas pressure response is astoundingly different, which implies that the pressure response alone cannot be used to predict spray differences.

At low flow conditions (all but cases D and F), a few cases stand out. First, H shows the highest OD means, which implies the geometry 5 (flushed and low angle) produces the widest spray. Next, E (flushed with normal angle) had the highest ID1 mean, while ID2 showed a fairly flat response among the cases. Higher diameters and higher gaps tended to lower the ID2. As in previous work, there is a strong retraction-angle coupling effect. COV results appear to be mixed, with some higher and lower than the base case.Cases E and G tend to have the highest COVs of the group, which is especially interesting given that they represent the two retraction extrema. J appears to have an unusually high OD1 tone. In terms of spectral magnitude, I and J are the highest for ID1, E and I are the highest for ID2, H is

Table 3: All video analysis results

	Norm. Means				COVs				Tones				Magnitudes			
Case	ID1	ID2	OD1	OD2	ID1	ID2	OD1	OD2	ID1	ID2	OD1	OD2	ID1	ID2	OD1	OD2
A	0.15	0.10	0.62	0.54	64	68	5.2	29	850	850	850	1500	5.9E+03	1.3E+03	1.8E+02	4.2E+03
B	0.16	0.10	0.61	0.54	63	73	7.1	32	860	1490	860	1500	5.9E+03	1.7E+03	1.5E+02	5.6E+03
C	0.13	0.10	0.61	0.55	74	68	6.5	29	850	850	850	1700	6.4E+03	2.5E+03	2.6E+02	1.1E+04
D	0.16	0.090	0.63	0.60	59	89	12	38	580	1800	1800	1800	6.5E+02	4.1E+02	9.4E+02	5.7E+03
E	0.22	0.10	0.62	0.51	40	94	10	48	1200	1200	1200	1200	6.0E+03	3.8E+03	3.7E+02	3.5E+04
F	0.25	0.11	0.64	0.60	43	72	14	48	1600	1600	1600	1600	2.4E+04	1.6E+03	9.9E+03	1.4E+05
G	0.13	0.10	0.60	0.55	80	84	16	32	190	170	1910	350	2.1E+03	6.2E+02	3.0E+02	9.8E+02
H	0.15	0.10	0.73	0.74	64	78	13	16	900	900	2510	390	1.6E+03	2.6E+02	5.8E+02	4.9E+02
I	0.14	0.10	0.62	0.55	67	66	3.3	24	850	850	850	1700	1.3E+04	4.1E+03	2.5E+02	4.0E+03
J	0.16	0.077	0.64	0.55	67	82	9.6	30	630	630	4080	1300	1.1E+04	2.0E+03	4.3E+02	1.1E+04
K	0.12	0.074	0.60	0.59	61	72	11	31	780	780	1410	1300	6.9E+02	3.7E+02	2.9E+02	5.8E+03
L	0.12	0.082	0.60	0.60	69	75	11	27	750	750	1410	1400	2.9E+03	1.2E+03	4.1E+02	3.8E+03
M	0.12	0.084	0.62	0.56	64	72	7.3	25	750	750	750	1600	3.1E+03	1.2E+03	3.9E+02	4.0E+03

(continued on page 11)

IMECE2012

THE 2012 IMECE will be held in Houston, Texas from November 9-15. Track 7 is co-organized between the Heat Transfer Division representative, Prof. S.A. Sherif, and the FED representative, Prof. F. Battaglia. Over 900 abstracts were received and approximately one-third of the abstracts were submitted to FED symposia and fora, with many authors from Asia and Europe. The 2013 FEDSM will be held in Lake Tahoe, Nevada from July 7-11 and Prof. Battaglia is the conference chair. Further details will be provided during the summer meeting in Puerto Rico. ■

Francine Battaglia
FED Secretary

Pulsatile Non-Newtonian Flow in a Three-Stream Coaxial Airblast Injector (continued from page 10)

the highest for OD1, and E is the highest for OD2. In short, retraction, angle, and the various diameters have influence on the diameter spectrum, but not the means.The increase in inner gas flow has a mixed effect on the diameter metrics. For the base case geometry, raising the flow seems to raise only the OD2 mean, while raising most COVs and dominant tones. ID2 actually fell. The ID magnitudes fell, while the OD magnitudes were both increased. For geometry 2, almost all diameters increased with increasing flow. The COVs were mixed, and most tones increased. All but one magnitude increased.FFT analyses were also carried out on the IG/OG pressure drop values from CFD using Matlab, and many other conclusions can be drawn from that work; however, that is beyond the scope of this document.

Conclusions

A computational program has been executed to characterize the flow field produced by a three-stream airblast reactor injector with various geometric configurations, flow rates, and flowing materials. Compressible, geometric reconstruction VOF-based CFD models, requiring weeks of run time each on multiple CPUs, are utilized for statistical comparisons of pressures and spray shape metrics. Approximately 14,000 CPU-hours were invested in the 2D RANS effort. This work follows prior efforts by Strasser (2010) and Strasser (2011), in which the effects of stream flow combinations and flow geometry were considered. The focus of the research program has shifted from studying air/water (AW) to studying slurry/high-density gas (SH). No other VOF-based airblast nozzle study has been found documented in the open literature. In addition to geometric and material changes, some CFD solver effects were considered. The following can be concluded:

- The flow patterns and pressure responses typically differ significantly between the current SH work and the air/water equivalent (AWE) counterparts. The base geometry spray profiles at the higher flows were similar, but no other metrics tended to line up. In some cases, the shifts in some SH metrics were the directional opposite of the AWE counterparts. Moreover, the CFD contour plots and spray patterns look nothing alike.
- Retraction and angle played the most significant role in the spray and pressure responses among the cases tested. Not only do they affect most measures significantly, but they affect the directions in the responses of some metrics to changes in flow rate. The two flushed cases had the highest recorded spray diameters for both flow rates tested. At the lower inner gas flow, a flushed design has a wider spray with a highly pronounced trimodal character. Higher inner gas flow tends to somewhat diffuse the differences.
- Increasing the inner gas flow, in general, increased the spray diameter means and temporal variation; however, the pressure COVs typically fell.
- The changes in the spray pattern with increasing inner gas flow depended on the geometry. The base geometry showed an increased spray angle with inner gas flow, while the flushed geometry showed a slight decrease.
- Modulation of the inner gas at its dominant tone with a mass flow variation of +/- 50% did not seem to affect many metrics for the water or slurry systems, except that the inner gas pulsation tended to tune-up for the slurry case.
- Except for the flushed and retracted cases, the diameter FFTs showed similar tones (or multiples of) as the pressure FFTs, indicating that the mechanisms driving each are similar.
- Intermediate pressure signals were sampled near the pre-filming zone. They were found to be typically more variable and have a more focused spectrum and the inlet values. Interestingly, the AWE inner gas shows the opposite trend as the SH case inner gas.
- Fluent 13SP2 produces results similar to those in version 12.1.2 for the metrics tested. Pressure various appears to be greater for the former.

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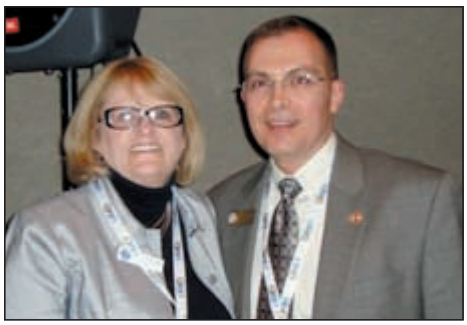
Photographs from IMECE2011 in Denver, Colorado, USA

Fellows Recognition Reception

Joel Park *(Navel Surface Warfare Center)* and ASME President Victoria Rockwell

Past ASME Presidents Richard Goldstein and Richard Rosenberg



ASME President Victoria Rockwell and Ted Heindel *(Iowa State U.)*

Not pictured but present at the Fellows Recognition Reception: Jinkook Lee (*Eaton Aerospace*)

Fluids Engineering Div. Reception

Reception Master of Ceremonies: Dave Halt (*PAX and FED Chair*)

Mo Hosni (*Kansas State U.*) receiving service award as FED Chair 2010–11 from Dave Halt

Presentation of ASME Fellow Certificate to Joel Park (*Naval Surface Warfare Center*) by Judith Bamberger (*Pacific NW Lab.*)

(continued on page 10)

Photographs from IMECE2011 in Denver, Colorado, USA (continued from page 12)

IMECE2011 Track Organizer: Jinkook Lee (*Eaton Aerospace*) recognizing individual contributions by FED members to the conference

Judith Bamberger (*Pacific NW Lab.*) and Karman and Urmila Ghia (*U. of Cincinnati*)

Ki-Won Lim (*Korea Research Institute of Standards and Science*), Joel Park, and Judith Bamberger

Young Engineer Paper Contest Awards

Presentations by Terry Beck (*Kansas State University*)

Honorable Mention: Harish Ganapathy (*U. of Maryland*)

Honorable Mention: Lori Halvorson (*Rensselaer Polytechnic Institute*)

Third Place: Ming-Jung Park (*Inha U., ROK*)

Second Place – Not pictured: Derek Endres (*Ohio State U.*)

First Place: Joel Hartenberger (*Valparaiso U.*)

FED Young Engineer Paper Contest

THE ASME Fluids Engineering Division (FED) sponsored the Young Engineer Paper (YEP) Contest for the 2011 International Mechanical Engineering Congress & Exposition (IMECE), November 11–17, 2011, at Denver, Colorado. There was a record number (over 50) of abstract submissions, and a total of 27 full papers were entered in the contest. A total of 5 finalist papers were selected for presentation in the YEP Contest Session, and to compete in the final phase of the contest. The papers and finalist presentations were subsequently judged by a review panel. The winners of the 2011 YEP Contest competition, announced at the IMECE FED evening reception, were as follows:

1st Place: Paper# IMECE2011-66278, "Experimental Investigation of Selective Withdrawal and Light Layer Entrainment of Stratified Immiscible Liquids," presented by Joel Hartenberger, Dept. of Mech. Eng., Valparaiso University

2nd Place: Paper# IMECE2011-65925, "Numerical Investigation of Pulsed Chemical Vapor Deposition of Aluminum Nitride to Reduce Particle Formation," presented by Derek Endres, Dept. of Mech. & Aero. Eng., Ohio State University

3rd Place: Paper# IMECE2011-65942, "Optimization of Ski Jumper's Posture Considering Liftto-Drag Ratio and Aerodynamic Stability in Pitch," presented by Min-Jung Park (Co-authors: Ki-Don Lee & Kwang-Yong Kim), Dept. of Mech. Eng., Inha University, Incheon, Republic of Korea

Honorable Mention Finalist Papers:

Paper# IMECE2011-66275, "Analyzing Compression and Buoyancy in Technical Swimming Suits," presented by Lori M. Halvorson, Dept. of Mech. Eng., Rensselaer Polytechnic Institute

Paper# IMECE2011-66279, "Phase Field Method for Simulation of Multiphase Flow," presented by Harish Ganapathy (Co-Authors: Ebrahim Al-Hajri, Michael M. Ohadi), Dept. of Mech. Eng., University of Maryland

The ASME Fluids Engineering Division (FED) is again sponsoring the Young Engineer Paper (YEP) Contest for the 2012 International Mechanical Engineering Congress & Exposition (IMECE), this coming November 9 – November 15, 2012, in Houston, Texas.

This contest may be entered by undergraduate students, recent baccalaureate engineers (i.e. graduation after April 2011), and beginning graduate students (i.e. start of graduate studies after April 2011). Contest participants should 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 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 IMECE 2012. All finalist papers will receive certificates acknowledging the First Place, Second Place, and Third Place award winners, as well as Honorable Mentions for the remaining Finalist participants.

Hurry, you still have time to submit an abstract for this years competition!

Schedule:

Abstract submittal—March 26, 2012
Author Notification of Abstract Acceptance~~—March 26, 2012~~ Extended April 13, 2012
Draft paper submittal—May 25, 2012
Contest Finalist Selection Notification—July 9, 2012
Submission Required Copyright Form (1903) for Publication*—August 17, 2012
Submission of Revised Draft Paper*—July 30, 2012
Submission of Final Paper*—August 20, 2012

**Final papers and forms MUST be received by ASME on August 20, 2012 for inclusion in the conference proceedings. Publication in the conference proceedings is not guaranteed if materials are received after this date.*

Please visit the IMECE 2012 home page https://www.asmeconferences.org/Congress2012/, 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 7-14. **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

IMECE2011 Track 11 (Fluids & Thermal Systems)

By Jinkook Lee, Ph.D., Vice Chair of FED, IMECE2011 FED Representative and Track 11 Chair, and Joint Conference Chair of 2012 ASME Heat Transfer, Fluids Engineering, and Nanochannels, Microchannels, and Minichannels Conferences (HTFNMM2012)

ASME 2011 International Mechanical Engineering Congress & Exhibition (IMECE2011) was held at Hyatt Regency Hotel & Convention Center in Denver, Colorado from November 11 to November 17, 2011.

Total of fourteen topics were organized for Track 11 by FED and 164 final papers were presented.

The list of topics, lead organizers, and numbers of final papers as follows:

- **11-1** Wind Turbines: Aerodynamics and Control, Prof. Jaikrishnan Kadambi, Case Western Reserve University, 9 final papers.
- **11-2** 20th Symposium on Industrial Flows, Dr. Wayne Strasser, Eastman Chemical Company, 21 final papers.
- **11-3** Forum on CFD Applications for Optimization and Controls, Prof. Z. Charlie Zheng, University of Kansas, 26 final papers.
- **11-4** Microfluidics 2011: Fluid Engineering in Micro- and Nanosystems, Prof. Chang-Hwan Choi, Stevens Institute of Technology, 26 final papers.
- **11-5** Noninvasive Measurements in Single and Multiphase Flows, Dr. Bahram Khalighi, General Motors R&D Center, 4 final papers.
- **11-6** Fluid Measurements and Instrumentation, Ms. Judith Bamberger, Pacific Northwest National Laboratory, 18 final papers.
- **11-7** 7th Forum on Recent Developments in Multiphase Flow, Dr. Malcolm Andrews, Los Alamos National laboratory, 14 final papers.
- **11-8** 12th Symposium on Advances in Materials Processing Science and Manufacturing, Prof. Dennis Siginer, Petroleum Institute, U.A.E., 5 final papers.
- **11-9** 9th Symposium on Electric, Magnetic & Thermal Phenomena in Micro and Nano-Scale Systems, Prof. Dennis Siginer, Petroleum Institute, U.A.E., 6 final papers.
- **11-10** 18th Symposium on Fluid Mechanics and Rheology of Nonlinear Materials and Complex Fluids, Prof. Dennis Siginer, Petroleum Institute, U.A.E., 18 final papers.
- **11-11** 10th Symposium on Fundamental Issues and Perspectives in Fluid Mechanics, Prof. Francine Battaglia, Virginia Polytechnic Institute and State University, 12 final papers.
- **11-13** Panels on Fluid Measurement Uncertainty.
- **11-14** Young Engineer Paper (YEP) Contest. 5 final papers.
- **11-15** Panel on CFD/EFD (Experimental Fluid Dynamics) Choice - Dilemma for Industries. ■

2012 Fluids Engineering Division Summer Meeting

Location and Time: The 2012 Fluids Engineering Division Summer Meeting will be held as a Joint Conference with ASME Summer Heat Transfer Conference, the Fluids Engineering Division Summer Meeting, and the International Conference on Nanochannels, Microchannels and Minichannels at the **Wyndham Rio Mar Beach Resort** in **Puerto Rico** from **July 8 to July 12, 2012**.

Conference Description: This conference will bring together international researchers and engineers focusing on heat and mass transfer and fluid flow in a variety of applications. The objectives of the meeting are to provide a forum for presentation of state-of-art research and opportunities for technical interactions among participants.

Conference Topics: There are total of 29 Tracks organized in the FEDSM2012. Contributions are being solicited on fundamental research and applications related to heat and mass transfer and fluid mechanics from large-scale to nano-scale. Conference topics include applications in the areas of energy systems, combustion, aerospace, gas turbines, electronic equipment, biotech, manufacturing, environment, multiphase flows, and nano-, micro-, and mini-channels. Theoretical, fundamental measurements, flow visualization, and computational heat transfer and fluid dynamics are also welcomed.

Website: http://www.asmeconferences.org/FEDSM2012/

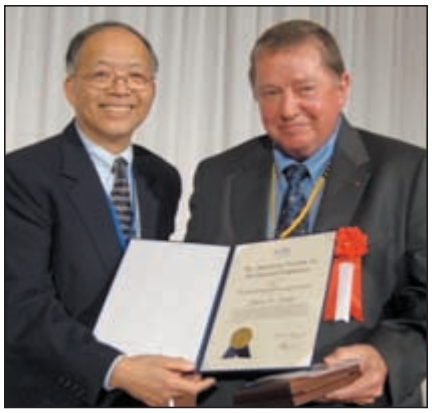
Photographs from FEDSM2011/AJK2011 in Hamamatsu, Japan

Plenary Speakers

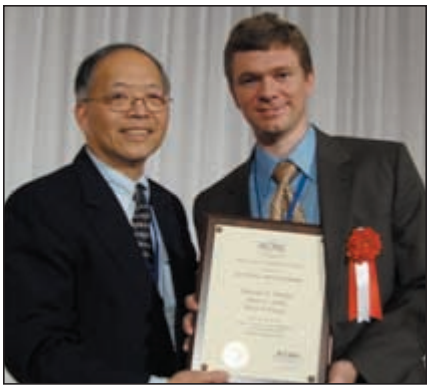
Dave Halt and Jim Riley (*U. of Washington*)

John Foss (*U. of Michigan*) and Yu-Tai Lee

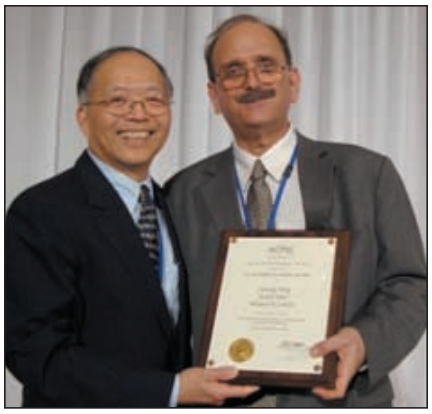
Honors and Awards



Fluids Engineering Award: Yu-Tai Lee and John Foss (*U. of Michigan*)



Moody Paper Award: Yu-Tai Lee and John Charonko (*Virginia Tech, accepting for the authors*)



Knapp Paper Award: Yu-Tai Lee and Joe Katz (*Johns Hopkins U.*)

JFE Associate Editor Award: Mo Hosni and Ted Heindel (*Iowa State U.*)

Outgoing Executive Committee Member and New ASME Fellow: Joel Park (*Naval Surface Warfare Center*) and Mo Hosni

New ASME Fellow: Jinkook Lee (*Eaton Aerospace*) and Mo Hosni

(continued on page 17)

Photographs from FEDSM2011/AJK2011 in Hamamatsu, Japan (continued from page 16)

2010-2011 Executive Committee
Jinkook Lee, Dave Halt, Bahram Khalighi (Member 2011-12), Mo Hosni, and Joel Park
(Francine Battaglia, Member 2010-11 not present)

Informal Photographs

Takayuki Mori (*Japanese Ministry of Defense*) and Joel Park

Bahram Khalighi (*General Motors*), Joel Park, Judith Bamberger (*Pacific NW Lab.*), and Bruce Napier (*Judith's husband*)

Hua Yang (*Yangzhou U., PRC*), Joel Park, and Chao Liu (*Yangzhou U., PRC*)

Joel Park and Jiunn-Haur Shaw (*Center for Measurement Standards, ROC*)

Malcolm Andrews (*Los Alamos*) and family with Mo Hosni

Keith Walters and Nicole Poe (*Mississippi State U.*) at Hamamatsu Train Station