T U F F P

Tulsa University Fluid Flow Projects

Director
Cem Sarica (918) 631-5154
cem-sarica@utulsa.edu

Associate Director
Holden Zhang (918) 631-5142
hong-quan-zhang@utulsa.edu

Director Emeritus
James P. Brill (918) 631-5114
brill@utulsa.edu

Co-Investigators
Mengjiao Yu (918) 631-2695
mengjiao-yu@utulsa.edu

Consortia Assistant
Linda M. Jones (918) 631-5110
jones@utulsa.edu

Research Associate
Xianghui (Paul) Chen (918) 631-5138
xianghui-chen@utulsa.edu
Qian Wang (918) 631-5107
qian-wang@utulsa.edu

Research Technicians
Scott Graham (918) 631-5147
sdgraham@utulsa.edu
Craig Waldron (918) 631-5131
craig-waldron@utulsa.edu

Research Assistants
Carlos Beltran (918) 631-5146
carlos-beltran@utulsa.edu
Kwonil Choi (918) 631-5109
kwon-choi@utulsa.edu
Gizem Ersoy (TUCoRE) (918) 631-5124
gizem-ersoy@utulsa.edu
Yongqian (Richard) Fan (918) 631-5119
yongqian-fan@utulsa.edu
Bahadir Gokcal (918) 631-5119
bahadir-gokcal@utulsa.edu
Mohammad Hossain (TUCoRE)(918) 631-5124
mohammad-hossain@utulsa.edu
Cengizhan Keskin (918) 631-5117
cengizhan-keskin@utulsa.edu
Maria Vielma Paredes (918) 631-5117
maria-vielmaparedes@utulsa.edu

Computer Manager
Ted Chapman (918) 631-5115
edward-chapman@utulsa.ed

Fax Number: **(918) 631-5112**

Web Addresses: **www.tuffp.utulsa.edu**

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Executive Summary

Progress on each research project is given later in this Newsletter. A brief summary of the activities is given below.

After the Fall 2004 Advisory Board meeting, data acquisition utilizing 6-in. flow loop has been completed for the low liquid loading project. A two-fluid model with new closure relationships of wetted wall fraction, liquid-wall friction factor and interfacial friction factor has been developed to predict pressure gradient, liquid holdup, wetted perimeter. The model has successfully been tested against the TUFFP databank and data from other sources. This project is expected to be completed by the next Advisory Board meeting.

Three-phase gas-oil-water flow is a common occurrence in the petroleum industry. The ultimate objective of TUFFP for gas-oil-water studies is to develop a unified model based on theoretical and experimental analysis. A preliminary model has already been developed. During this reporting period, tests have been conducted for horizontal configuration at various flow rates and water cuts. Testing will resume in Spring 2005. Currently, the analysis of the acquired data to improve the existing and/or develop the new closure relationships is underway.

Oils with viscosities as high as 10,000 cp are produced from many fields around the world. Current multiphase flow models are largely based on experimental data with low viscosity fluids. Thus, the gap between actual lab data and field data may be three orders of magnitude or more. A new facility is being constructed in the Model Lab for the experimental part of this study. The facility consists of a 64.0-ft long pipe with a 27.0-ft visualization section. Currently, the operational problems related to separation of viscous oil and water are being addressed.

Severe slugging can occur in multiphase pipeline-riser systems at relatively low or moderate flow rates primarily in mature fields for which water production along with oil and gas is almost inevitable. The main objectives of this study are to investigate severe slugging occurrence, prediction and elimination for three-phase gas-oil-water flow. Data acquisition has mostly been completed. Currently, data processing and analysis are underway. Initial processing indicates segregation between the two liquid phases and cyclic behavior in oil and water production. This Spring additional tests will be conducted based on the results of the data analysis.

In multiphase flows, there are many cases where droplets are entrained from or coalesced into a continuous homo-phase. For example, in annular mist flow the liquid droplets are in dynamic equilibrium with the film on the walls, experiencing both entrainment and coalescence. Similarly, in oil-water flows, the observed mixing and/or separation involve both entrainment and coalescence. The primary objective of “Droplet-Homophase Interaction” study is to

develop more accurate and reliable closure relationships for mechanistic multiphase models. This study has been started with a sensitivity analysis of the unified model to its various closure relationships. Entrainment fraction was found to be the most sensitive closure relationship for stratified and annular flows while the translational velocity appeared to be the sensitive parameter for slug flow. Various entrainment fraction correlations utilizing actual phase velocities are believed to represent the physics of the flow more accurately. These correlations will soon be tested against the available data.

A coordinated work between TUFFP and Tel-Aviv University resulted in a slug tracking model which is capable of tracking individual slugs and simulate the basic mechanisms of slug growth, generation and dissipation. The current version of the code has several limitations to be improved. This project is currently pursued in collaboration with Dr. Eissa Alsafran of Kuwait University.

New Research Assistant Arrived

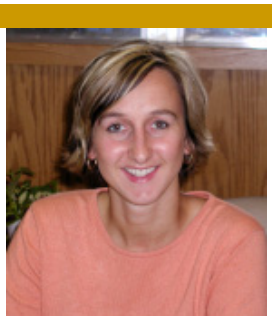
Kwon Il Choi

Mr. Kwon Il Choi from Brazil joined our team in the Spring 2005 to pursue his Ph.D degree in Petroleum Engineering. He received his B.S. degree in Metallurgical Engineering from Federal University of Rio Grande do Sul in Brazil in 1981 and M.S. degree in Petroleum Engineering from State University of Campinas (UNICAMP) in Brazil in 1996. Kwon Il began his career working as a COBOL programmer in 1982, and he joined PETROBRAS as a Production Engineer in 1983. Since that time, he has worked as a field engineer in completion and workover and also in artificial lift design for rod pumping, PCP and gas-lift. In 1998 he began working in multiphase flow for deep-water production systems. He has developed several GUI softwares for PETROBRAS in field data management, rod pumping design, database for rod pumping dynamometer cards with graphical pattern recognition, transient plunger lift simulation, transient multiphase simulation for gas-lift, input data translation between Pipesim and FloSystem and black-oil PVT table generation for OLGA. Kwon Il is fully supported by PETROBRAS. He will be assigned to a TUFFP project.

Congratulations to Our Recent Graduate

Guilherme Couto

Guilherme Couto, a Research Assistant in TUPDP, has successfully completed his MS degree requirements in Petroleum Engineering. He has recently accepted a position with PETROBRAS in Brazil. We wish Guilherme well in his future endeavors.



Wendy Fusselman

Project Coordinator Leaves

Wendy Fusselman, the Project Coordinator in TUPDP and related projects has resigned effective December 1, 2004 to assume a position with William Communications. We wish her well in her future endeavors. Project Coordinator position will not be filled at this time. Linda Jones, Project Assistant with TUFFP and related projects, has assumed the responsibilities of the project accounts.

Howard Rettig Retires

Mr. Howard Rettig, a Mechanical Technician and flow loop operator with TUFFP and related projects, has recently retired after over seven years of service to The University of Tulsa in different capacities. He will be remembered by all of us for his dedicated service to TUPDP and TUFFP. Craig Waldron has assumed his job responsibilities.

TUFFP Membership and Support

I am happy to announce that Landmark Graphics has become a member of TUFFP effective 2004. With this addition, we closed 2004 with 14 members, 13 industrial companies and MMS. DOE supports TUFFP in the development of new generation multiphase flow predictive tools for three-phase flow research. DOE's support translates into the equivalent 4 additional members for five years, effective July 2003.

Due to uncertainties in YUKOS' future, YUKOS decided not to renew their membership for 2005. Efforts are underway to increase TUFFP membership. PETROBRAS has recently indicated their intention to join TUFFP for 2005.

TUFFP Financial Status

The total of 2004 TUFFP expenditures through Industry, MMS, and DOE accounts is now projected to be $590,000. The breakdown of the expenditures is $370,000, $50,000, and $170,000 for Industry, MMS and DOE accounts, respectively. The 2004 Industry and MMS membership income is expected to be $500,000. We are still waiting for payment from one of our industrial members. We entered 2004 with a combined Industry and MMS reserve account balance of $168,000. Provided that the remaining membership fee is collected, we expect to close 2004 with a combined reserve balance close to $250,000. The projected increase in the reserves is primarily due to recent increase in our 2004 membership, savings in equipment expenditures, and salary relief from related projects. TUFFP's 2005 Industry and MMS membership income is anticipated to be $520,000. Currently, 8 out of 13 members have already paid their 2005 membership dues. Our expenditures for 2005 TUFFP and MMS accounts are collectively projected to be $540,000.

Current TUFFP Members

Baker Atlas

BP

ChevronTexaco

ConocoPhillips

Landmark Graphics

Marathon Oil Co.

Minerals Management Services

PDVSA-Intevep

Pemex

Petronas

Saudi Aramco

Schlumberger

TOTAL

Emerson Process Management Makes Equipment Donation

The Emerson donation valued in excess of $24,000 includes Rosemount compact orifice flowmeters, pressure transmitters, RTDs and temperature transmitters. This equipment will be used within TUFFP and TUPDP to provide petroleum engineering students a working knowledge of basic instrumentation and process measurement and control.

We would like to thank Pat Gibson and Pam Smith of Emerson Process Management for their help in arranging these donations.

Qian Wang

Software Improvement

A major effort is underway to improve the software deliverables to our members. The objective of this effort is to improve and increase the use of the developed multiphase technology by our membership. Microsoft's Excel platform was selected as the interface, regardless of the scientific programming language such as FORTRAN, C++, etc. The Hydrodynamic Models (including the mechanistic models and the unified model) and Heat Transfer models (including the mechanistic model developed by Manabe and the recent unified model) are combined together to predict pressure gradient and temperature gradient with the same package. The FORTRAN program has been tested. The VB Excel interface with the new program is expected to be demonstrated at the next TUFFP ABM.

Web Site News!

All past TUFFP publications are now available on the web site. We are currently working on making all past data and software available. Since late October, several data and software have been added relating to past projects. For a list of items added to the web page, please visit www.tuffp.utulsa.edu/news.htm.

Meetings/Conferences

Spring 2005 Advisory Board Meetings

Plans have now been finalized for the Spring 2005 Advisory Board meetings. A tour of the test facilities will be held on Tuesday, March 29th at 3:00 p.m. Following the tour, there will be a joint TUFFP/TUPDP BBQ between 5:00 - 7:00 p.m. The TUFFP Advisory Board meeting, the TUFFP/TUPDP reception, and the TUPDP Advisory Board meeting will all be held at the Doubletree Hotel at Warren Place. The TUFFP Advisory Board meeting will begin at 8:30 a.m. on Wednesday, March 30th and will adjourn at 5:00 p.m. Following the TUFFP meeting, there will be a joint TUFFP/TUPDP reception from 6:00 - 9:00 p.m. The TUPDP Advisory Board meeting will be held on March 31st. The meeting will begin at 8:00 a.m. and will adjourn at 5:00 p.m. The TU Hydrate JIP (TUHFP) Advisory Board meeting will be held on Friday, April 1st at The University of Tulsa in the President's Lounge in the Allen Chapman Activity Center. A social function is planned for Thursday evening, March 31st also to be held in the President's Lounge. The Request for Information form and hotel information will be placed on the web page soon. All persons from your company that plan to attend the Advisory Board meetings, should complete and return these forms as soon as possible to help us plan the meetings. Information on the Advisory Board meetings can also be found on our web site at www.tuffp.utulsa.edu/abminfo.htm. You can then follow the links for the Request for Information form. TUFFP Advisory Board meeting brochures will be available for members at the meeting and a concerted effort will again be made to have the combined brochure and slide copy available for downloading from the web site at http://www.tuffp.utulsa.edu/abmbrochures.htm shortly before the meeting. The brochure will contain sufficient information to help each attendee actively participate in discussions on current and future research projects, financial matters, and operating procedures.

BHRg's Multiphase Production Technology 05 to Be Held in Barcelona, Spain

BHR Group's Conference on Multiphase Production Technology '05 is scheduled to be held between 25-27 of May 2005 in Barcelona, Spain. Multiphase Production Technology '05 will benefit anyone engaged in the application, development and research of multiphase technology for the oil and gas industry. Applications in the oil and gas industry will also be of interest to engineers from other industries for whom multiphase technology offers a novel solution to their problems. We strongly encourage our members to participate in this conference. It is expected that the conference will benefit anyone engaged in the application, development and research of multiphase technology for the oil and gas industry.

The conference is being structured into themes that will be introduced by one or more Review Papers that describe aspects of: "*Today's Technology*". These will be followed by the traditional accepted technical papers that feature new developments, new applications and hitherto unpublished work: "*Tomorrow's Technology*". Finally, throughout the Conference, delegates will be invited to post their views on a notice board as a contribution to the debate on the technology gaps and the needs for the future: "*Next Week's Technology*". These will be discussed during the Closing Technology Review. There will be five themes in the Multiphase Production Technology Conference: 1. Laboratory and Field Measurement 2. Process, Measurement and Control Equipment and Analysis 3. Production Chemistry 4. Modeling and Simulation 5. Thermal Management. The detailed information about the conference can be found on BHRg's web site www.brhgroup.com.

TUFFP Short Course

The 30th TUFFP "Two-Phase Flow in Pipes" short course is scheduled to be taught May 9-13, 2005 in Tulsa by Dr. Sarica and Dr. Brill. The course covers the most current, up-to-date-research performed at the Tulsa University Fluid Flow Projects (TUFFP) and Tulsa University Paraffin Deposition Projects (TUPDP). This five-day course is focused on the fundamentals of two-phase flow in piping systems encountered in the production and transportation of oil and gas. The short course will include a half-day session on paraffin deposition in pipes. For this short course to be self sustaining, at least 10 enrollees are needed. We urge our TUFFP and TUPDP members to let us know soon if they plan to enroll people in the short course. Information regarding the short course can be found at www.tuffp.utulsa.edu/calendar.htm.

Upcoming ABM's

March 29, 2005

TUPDP/TUFFP Facilities Tour
The University of Tulsa North Campus
2450 East Marshall
Tulsa, Oklahoma
3:00 - 5:00 p.m.

TUPDP/TUFFP Barbeque
The University of Tulsa North Campus
2450 East Marshall
Tulsa, Oklahoma
5:00 - 7:00 p.m.

March 30, 2005

TUFFP Advisory Board Meeting
Doubletree Hotel at Warren Place
6110 South Yale Avenue
Tulsa, Oklahoma
8:00 a.m. - 5:00 p.m.

TUFFP/TUPDP Reception
Doubletree Hotel at Warren Place
6110 South Yale Avenue
Tulsa, Oklahoma
6:00 - 9:00 p.m.

March 31, 2005

TUPDP Advisory Board Meeting
Doubletree Hotel at Warren Place
6110 South Yale Avenue
Tulsa, Oklahoma
8:00 a.m. - 5:00 p.m.

TUHFP Reception
Charleston's Restaurant
6839 S. Yale
Tulsa, Oklahoma
6:00 p.m.

April 1, 2005

Hydrate JIP Advisory Board Meeting
The University of Tulsa
Allen Chapman Activity Center
Tulsa, Oklahoma
8:00 a.m. - 5:00 p.m.

Progress Updates

Experiments and Modeling of Gas-Oil-Water Flow in Horizontal Pipes

Three-phase gas-oil-water flow is a common occurrence in the petroleum industry. Perhaps, the most relevant practice is the transportation of natural gas-oil-water mixtures through pipelines. Three-phase flow may also be encountered in pumping systems, especially in surface gathering lines, and in wellbores and surface gathering systems of many flowing and gas lift wells which produce water along with oil and gas.

Cengizhan Keskin

The ultimate objective of TUFFP for gas-oil-water studies is to develop a unified model based on theoretical analysis and experimental results for the prediction of flow behavior during production and transportation of gas-oil-water in pipelines. This study is the first of a series of gas-oil-water studies.

The experimental work is being conducted using the TUFFP gas-oil-water flow facility. The facility consists of a closed circuit loop with the following components: pumps, heat exchangers, metering sections, filters, test section, separator and storage tanks. The test section is attached to an inclinable boom.

Gas-oil-water tests have been conducted for horizontal pipe at various flow rates and water cuts. All the tests for 20, 40, 50 and 60% water cuts and some of the 80% water cut tests have been completed. Quick-closing valves, conductance probes, capacitance sensors and a gamma densitometer were used to obtain phase fractions and flow characteristics, and pressure and differential pressure transducers were used to measure pressure gradients.

After several discussions and two demonstrations, a high speed video system was purchased. It was found to be very helpful in identifying the flow patterns and determining oil-water mixing status. It can also be used to determine droplet size distribution for diluted dispersion.

A modeling approach similar to TUFFP's unified hydrodynamic model for gas-liquid pipe flow can be used for the gas-oil-water three-phase flow modeling as well. Basic equations and approaches of the unified model and the required closure relationships have been proposed.

Current efforts are focused on the analysis of the acquired data and further possible improvements on the closure relationships. Final report is intended to be completed by August 2005.

Low Liquid Loading Gas-Liquid Flow in Near-Horizontal Pipes

A more accurate prediction of pressure gradient and liquid holdup in near-horizontal, wet-gas pipelines is needed to better size pipelines and downstream processing facilities. The objective of this study is to investigate, experimentally and theoretically, low liquid loading gas-

Richard Fan

liquid two-phase flow in near-horizontal pipes, and to develop improved design models for wet-gas pipelines.

Two sets of facilities have been used for this study. On the 50.8-mm acrylic flow loop, both air-oil and air-water low liquid loading two-phase flow experiments have been performed, with the inclination angle changing from -2˚ to 2˚ from horizontal. The gas superficial velocity changes from 5 to 25 m/s, and the liquid superficial velocity is from 0.00025 to 0.03 m/s. The measured parameters include gas flow rate, liquid flow rate, pressure, differential pressure, temperature, liquid holdup, liquid film flow rate and liquid entrainment fraction. On the flow loop of 149.6-mm diameter PVC pipe, experiments have been completed, with the inclination angles of -2˚, 0˚ and 2˚. The gas superficial velocity varies from 7.5 to 21 m/s, and the liquid superficial velocity varies from 0.00075 to 0.05 m/s.

A two-fluid model with new closure relationships of wetted wall fraction, liquid-wall friction factor and interfacial friction factor has been developed to predict pressure gradient, liquid holdup, wetted perimeter under the given operation conditions, fluid properties and pipeline geometry.

The TUFFP databank and data from other sources is used to evaluate the proposed model. A screening process is applied to the databank to select the low liquid loading two-phase flow data points. Comparison between the model predictions and the experimental data from the databank shows good agreement for both liquid holdup and pressure gradient.

Effect of High Viscosity on Multiphase Flow Behavior

Bahadir Gokcal

High viscosity oils are produced from many oil fields around the world. Oil production systems are currently flowing oils with viscosities as high as 10,000 cp. Current multiphase flow models are largely based on experimental data with low viscosity liquids. Commonly used laboratory liquids have viscosities less than 20 cp. Thus, the gap between actual laboratory data and field data is three orders of magnitude or more. The current mechanistic models need to be verified with higher liquid viscosity experimental results. Modifications or new developments may be necessary.

The objectives of this study are:

- Experimental investigation of the effect of liquid viscosity on multiphase flow behavior by identifying the differences in flow behavior of high and low viscosity oils;
- Modification of the existing models or development of a new model for multiphase flow of high viscosity oils.

A new 2-in. ID high viscosity indoor facility is being constructed at The University of Tulsa North Campus Research Complex. The metering section, test section, heating and cooling systems are the major components of the facility. The indoor test facility consists of a 62-ft long, 2-in. ID pipe with a 30-ft long transparent acrylic pipe section. The inclination angle can be changed from -2° to 2° from horizontal.

The superficial liquid and gas velocities will vary from 0.008 to 2 m/s and from 0.85 to 20 m/s, respectively. The lower limits of superficial velocities were determined by accuracies of micromotion meters. The higher limits were set by pressure gradient and facility limits. The experiments will be performed at temperatures from 60°F to 100°F, and the viscosities will vary from 900 cp to 200 cp, inversely proportional to temperature.

All instruments have been installed on the facility. Currently, electrical connections of the instruments are being made. Differential pressure transducers, temperature transducers, capacitance sensors will be calibrated after the electrical connections. The calibration curves will be integrated into the DAQ software. Motor frequency drive will be installed to control the oil pump speed and the oil flow rate. The facility is expected to be completed and commissioned by Spring 2005.

Investigation of Occurrence of Severe Slugging for Gas-Oil-Water Flow in Pipeline-Riser Systems

Severe slugging can occur in multiphase pipeline-riser systems, which are typical in deep water petroleum production. Severe slugging can cause periods of no liquid and gas production in the separator, followed by very high liquid and gas flow rates. This phenomenon is very undesirable due to large pressure and flow rate fluctuations. The main purpose of this study is to investigate severe slugging

Carlos Beltran

occurrence, prediction and elimination for gas-oil-water flow.

TUFFP severe slugging test facility consists of a 65 ft pipeline followed by a 48 ft riser, and the inner diameter of the transparent R-4000 PVC pipe is 3 inches. The liquid and gas flow rates were varied in the region of 0.1 – 2.0 m/s and 0.1 – 3.0 m/s, respectively. Different water cuts (20, 40, 60, 80 and 100%) in the liquid phase were tested to study the effects of water in the severe slugging occurrence.

During the summer of 2004, the data were collected for downward inclination angles of –1°, –3° and –5°, and at different water cuts. The severe slugging envelopes have been generated. Moreover, some of the data are analyzed for the distribution of water in the riser during a severe slugging cycle. The results showed that the average liquid density in each section changes with time during the slug production cycle indicating the partial separation of the liquids in the riser. Water is the heaviest component in the system and can flow into the riser through the bottom elbow. At the same time, it can block the oil stream into the riser. This results in an oil accumulation in the pipeline and an increase of the water cut in the riser. When the gas in the pipeline gains enough pressure and starts to push the liquids into the riser, the accumulated oil penetrates the water blockage and flows into the riser decreasing the water cut in the riser until the gas starts to enter the riser and the blowout occurs.

After the completion of data processing and analysis, the modeling study will be conducted. Previously developed models will be reviewed and modified for the three-phase severe slugging prediction.

Paul Chen

Droplet-Homophase Interaction Study

In multiphase flows, there are many cases where droplets are entrained from or coalesced into a continuous homo-phase. For example, in annular mist flow the liquid droplets are in dynamic equilibrium with the film on the walls, experiencing both entrainment and coalescence. Similarly, in oil-water flows, the observed mixing and/or separation involve both entrainment and coalescence. The primary objective of "Droplet-Homophase Interaction" study is to develop more accurate and reliable closure relationships for mechanistic multiphase models. This study has been started with a sensitivity analysis of the unified model to its various closure relationships.

A preliminary sensitivity study was carried out using TUFFP unified model by examining the predicted pressure gradient variations resulted from the uncertainties of the closure relationships, including the droplet entrainment fraction, interfacial friction factor and interfacial perimeter for stratified flow and annular flow. An uncertainty level of ±10% was used. The fluids were air and water. The pipe diameters ranged from 1 to 6 in. with several inclination angles (-10°, -2°, 0°, 30°).

The translational velocity appears to be an important factor for the accuracy of the slug flow predictions.

For the stratified and annular flows, the sensitivity analysis indicated that the pressure gradient variations increased with entrainment fraction and could become drastically severe when the entrainment fraction was high. The influence of interfacial friction factor and interfacial perimeter on the predicted pressure gradient was nominal, and the pressure gradient variations were within a reasonable range of about 10%. In the unified model, the interfacial friction factor and interfacial perimeter are implicitly calculated using the local flow parameters. The effects caused by the uncertainty on these parameters can then be stabilized by adjusting other relative parameters correspondingly. However, the droplet entrainment fraction is currently determined explicitly using the superficial velocities of gas and liquid possibly resulting in amplified sensitivity. Various entrainment fraction correlations utilizing actual phase velocities are believed to represent the physics of the flow more accurately. These correlations will soon be tested.

Two-Phase Slug Tracking Model (Program Enhancement and Improvement)

Modeling slug flow was first proposed by Dukler and Hubbard[1]. Their general approach was used and modified by later investigators to improve the model predictions. All the proposed models assume a constant slug length once a slug is formed and developed to a stable slug. In reality, slugs may grow, shrink, dissipate or new slugs can be generated as the slugs travel downstream the pipeline. Under certain conditions, very long slugs may be generated that may be detrimental to the separation operations. More sophisticated models (slug tracking models) to monitor the transient behavior of slugs as they are generated and move in the pipelines were a recent focus in two-phase flow research efforts. A coordinated work between TUFFP and Tel-Aviv University resulted in a slug tracking model which is capable of tracking individual slugs and simulate the basic mechanisms of slug growth, generation and dissipation in hilly-terrain pipelines.

The current version of the code has several limitations which could be improved to enhance the code and make it user friendly. The following list summarizes those limitations:

- The program runs on DOS operating system using Lahey FORTRAN 77™ compiler. It does not run on a Windows™ based FORTRAN.
- There are no input files. The user has to enter the input variables by searching for them in the program.
- To generate graphical outputs, one has to run a BASIC program (on DOS) to generate plots on the screen. It is extremely difficult to move these plots around and it is impossible to edit or modify them after they are plotted.
- The program neither was adequately commented nor followed TUFFP coding standards.
- The slug length distributions at the pipeline entrance and at the lower elbow are user inputs.

Several modifications can be made to the program to enhance its results and to make it a user friendly program. The following is a list of these modifications:

- Update the program to Windows™based FORTRAN. This requires some modifications of the code commands and syntax.
- Create two input files, one for geometrical and operational conditions and fluid physical properties, and the other for control variables.
- Plot the graphical outputs in Excel using plotting Macros.
- Integrate the two models for slug length distribution at the pipeline entrance and bottom elbow that were recently developed (Alsafran *et al.*[2]).
- Develop a Graphical User Interface (GUI) to facilitate better use of the simulator.

A detailed report will be presented during the next TUFFP advisory board meeting in March 2005.

References

1. Dukler, A.E. and Hubbard, M.G., "A Model for Gas-Liquid Slug Flow in Horizontal and Near Horizontal Tubes", I&EC Fundamentals, 14, 1975, pp. 337-347.
2. Alsafran, E., Taitel, Y. and Brill, J. 2004: "Prediction of Slug Length Distribution along A Hilly-Terrain Pipeline Using Slug Tracking Model," ASME, J. Energy Resour. Technol. 122, pp. 54-62.

Related Research

Several related projects are underway. The related projects involve sharing of facilities and personnel with TUFFP.

Paraffin Deposition Projects

TUPDP started its second three years phase on March 31, 2004 with 15 members. The studies continue in three areas namely, single phase deposition, multiphase deposition and pigging. This phase of the project focuses on model and software development, supported by experimental studies. Experimental studies will include high pressure oil-water hydrodynamic studies using Garden Banks Condensate and Tulsa City Water. The results of this study will be made available to TUFFP membership as part of collaboration between TUFFP and TUPDP.

Mr. Guilherme Couto has successfully completed his MS studies and recently hired by Petrobras. Currently, Mr. Antoino Bruno and Ms. Gladys Sucre are working towards their MS degrees studying oil-water flow paraffin deposition and assessment of current single-phase deposition models and development of better models, respectively.

TUCoRE High Viscosity Multiphase Flow (HVMF) Studies

The Center of Research Excellence (TUCoRE) initiated by ChevronTexaco at The University of Tulsa funds several research projects on multiphase production.

TUFFP researchers are involved in TU CoRE activities through conducting the HVMF studies. Two students, Ms. Gizem Ersoy and Mr. Mohammad Hossain are working towards their MS degrees. The studies are currently focusing on the development of improved viscosity and inversion point (for oil-water mixtures) prediction tools.

Calendar of Events

2005

February 2 - 4	International Symposium on Oilfield Chemistry-The Woodlands Waterway Marriott Hotel and Convention Center-Houston, Texas
March 12 - 15	Middle East Oil & Gas Show and Conference (MEOS)-Bahrain International Exhibition Centre-Kingdom of Bahrain
March 29	TUPDP/TUFFP/TUHFP Tour of Facilities and Barbecue-The University of Tulsa North Campus-Tulsa, Oklahoma
March 30	TUFFP Advisory Board Meeting-Doubletree Hotel at Warren Place-Tulsa, Oklahoma
	TUPDP/TUFFP Reception-Doubletree Hotel at Warren Place-Tulsa, Oklahoma
March 31	TUPDP Advisory Board Meeting-Doubletree Hotel at Warren Place-Tulsa, Oklahoma
April 1	TU Hydrates JIP Advisory Board Meeting-The University of Tulsa-Allen Chapman Activity Center-Tulsa, Oklahoma
April 3 - 7	NACE Corrosion-2005, George R. Brown Convention Center-Houston, Texas
April 10 - 14	AIChE 2005 Spring National Meeting-Hyatt Regency-Atlanta, Georgia
April 16 - 19	SPE Production and Operations Symposium-Cox Business Services Convention Center-Oklahoma City, Oklahoma
May 2 - 5	Offshore Technology Conference-Reliant Center at Reliant Park-Houston, Texas
May 9 - 13	Fluid Flow Projects “Two-Phase Flow in Pipes” Short Course-College of Engineering and Natural Sciences Harvard Center-Tulsa, Oklahoma
May 25 - 27	Multiphase Production Technology ‘05-Barcelona, Spain
June 20 - 23	Latin American and Caribbean Petroleum Engineering Conference (LACPEC)-Intercontinental Hotel-Rio de Janeiro, Brazil
July 17 - 22	ASME Heat Transfer Conference ‘05-Westin St. Francis Hotel-San Francisco, California
September 6 - 9	Offshore Europe 2005-Aberdeen Exhibition and Conference Centre-Aberdeen, United Kingdom
October 9 - 12	SPE Annual Technical Conference and Exhibition (ATCE)-Dallas Convention Center-Dallas, Texas
November 21 - 23	International Petroleum Technology Conference (IPTC)-Qatar International Exhibition Centre-Doha,Qatar

Relaxing after the ABM in Houston!!