

Society of Petroleum Engineers



**MECHANISTIC  
MODELING OF  
GAS-LIQUID  
TWO-PHASE  
FLOW IN PIPES**

OVADIA SHOHAM

# Mechanistic Modeling Of Gas Liquid Two Phase Flow In Pipes

**Mohamad Fakhrol Radzi Zulkefli**



## **Mechanistic Modeling Of Gas Liquid Two Phase Flow In Pipes:**

*Mechanistic Modeling of Gas-liquid Two-phase Flow in Pipes* Ovadia Shoham, 2006 The objectives of this book are twofold to provide insight and understanding of two phase flow phenomena and to develop analytical tools for either designing two phase flow systems or conducting research in this area The traditional approach for two phase flow prediction was based on the development of an empirical correlation from experimental data This book presents the recent approach in which mathematical mechanistic models are developed based on the physical phenomena to predict two phase flow behavior The models can be verified and refined with limited experimental data However as these models incorporate the physical phenomena and the important flow variables they can be extended to different operational conditions and can enable scaleup with significant confidence

*One-dimensional Mechanistic Modelling of Gas-liquid Two Phase Flow in Pipes* Zifan Tang, 1991

## **Integrated Modeling of Reservoir Fluid Properties and Multiphase Flow in Offshore Production**

**Systems** Tobias R. Gessner, Jader R. Barbosa Jr., 2023-10-03 The book is intended for practicing engineers in the oil industry researchers and graduate students interested in designing and simulating offshore hydrocarbon production systems It approaches offshore oil production systems from an integrated perspective that combines the modeling of thermophysical properties of reservoir fluids and their flow as a multiphase mixture in wellbores flow lines and risers The first part of the book presents an internally consistent method to compute the critical parameters and acentric factor of Single Carbon Number SCN fractions of petroleum mixtures using state of the art multivariate fitting techniques The procedure is illustrated and validated using flash and differential liberation data from actual field samples In the second part of the book mechanistic multiphase flow models are discussed in light of their ability to predict the pressure temperature and phase holdup of production fluids in wellbores flow lines and risers Multivariate fitting procedures are again applied to evaluate the sensitivity of the results with respect to closure relationship parameters such as slug body gas holdup wall shear stress and wall roughness in pipelines and production tubing Finally the modeling framework is validated using actual field data from offshore production wells

*Multiphase Transport of Hydrocarbons in Pipes* Juan J. Manzano-Ruiz, Jose G.

Carballo, 2024-04-09 Multiphase Transport of Hydrocarbons in Pipes An introduction to multiphase flows in the oil and gas industry The term multiphase flow refers to the concurrent flow of oil and or gas alongside other substances or materials such as production water chemical inhibitors and solids e g sand This is a critical topic in the oil and gas industry where the presence of multiple flow phases in pipelines affects deliverability generates serious complications in predicting flow performance for system design and operation and requires specific risk mitigation actions and continuous maintenance Chemical and Mechanical Engineers interested in working in this industry will benefit from understanding the basic theories and practices required to model and operate multiphase flows through pipelines wells and other components of the production system Multiphase Transport of Hydrocarbons in Pipes meets this need with a comprehensive overview of five

decades of research into multiphase flow Incorporating fundamental theories historic and cutting edge multiphase flow models and concrete examples of current and future applications This book provides a sound technical background for prospective or working engineers in need of understanding this crucial area of industry Readers will also find Fundamental principles supporting commercial software Detailed tools for estimating multiphase flow rates through flowlines wells and more Integration of conservation principles with thermodynamic and transport properties Coverage of legacy and modern simulation models This book is ideal for flow assurance engineers facilities engineers oil and gas production engineers and process engineers as well as chemical and mechanical engineering students looking to work in any of these roles *Flow Assurance in Pipelines* Saeid Mokhatab, Juan Manzano-Ruiz, Antonin Chapoy, Jonathan J. Wylde, 2025-11-27 Flow assurance is critical for effective design and operation of hydrocarbon production and transmission systems The aim is to ensure safe and economical flow of hydrocarbon fluids from the source to the markets As future development of hydrocarbon resources moves into more challenging environments the importance of flow assurance is becoming more asserted Written by an internationally recognized team of experts Flow Assurance in Pipelines A Reference Guide is a unique well researched and comprehensive work in the flow assurance discipline that addresses the stages of a flow assurance study and identifies how they relate to the pipeline system design and operation This book is a fundamental resource for flow assurance engineers pipeline engineers operators and production chemists providing a detailed explanation of basic flow assurance issues that can arise in the pipeline systems and discusses practical methods to solve those issues safely and cost effectively Provides a systematic understanding of the concept of flow assurance Discusses flow assurance challenges in pipelines and how to overcome them Reviews latest flow assurance technologies engineering principles and practices Describes the best operating philosophies of pipeline systems to minimize flow assurance risks Explores sustainable pipeline applications in the transition to a low carbon economy *Engineering Fluid Dynamics 2019-2020* Bjørn H. Hjertager, 2021-02-25 This book contains the successful submissions to a Special Issue of Energies entitled Engineering Fluid Dynamics 2019 2020 The topic of engineering fluid dynamics includes both experimental and computational studies Of special interest were submissions from the fields of mechanical chemical marine safety and energy engineering We welcomed original research articles and review articles After one and a half years 59 papers were submitted and 31 were accepted for publication The average processing time was about 41 days The authors had the following geographical distribution China 15 Korea 7 Japan 3 Norway 2 Sweden 2 Vietnam 2 Australia 1 Denmark 1 Germany 1 Mexico 1 Poland 1 Saudi Arabia 1 USA 1 Serbia 1 Papers covered a wide range of topics including analysis of free surface waves bridge girders gear boxes hills radiation heat transfer spillways turbulent flames pipe flow open channels jets combustion chambers welding sprinkler slug flow turbines thermoelectric power generation airfoils bed formation fires in tunnels shell and tube heat exchangers and pumps Fundamentals of Gas Lift Engineering Ali Hernandez, 2016-02-18 Fundamentals of Gas Lift Engineering Well Design and Troubleshooting discusses

the important topic of oil and gas reservoirs as they continue to naturally deplete decline and mature and how more oil and gas companies are trying to divert their investments in artificial lift methods to help prolong their assets While not much physically has changed since the invention of the King Valve in the 1940s new developments in analytical procedures computational tools and software and many related technologies have completely changed the way production engineers and well operators face the daily design and troubleshooting tasks and challenges of gas lift which can now be carried out faster and in a more accurate and productive way assuming the person is properly trained This book fulfills this training need with updates on the latest gas lift designs troubleshooting techniques and real world field case studies that can be applied to all levels of situations including offshore Making operational and troubleshooting techniques central to the discussion the book empowers the engineer new and experienced to analyze the challenge involved and make educated adjustments and conclusions in the most economical and practical way Packed with information on computer utilization inflow and outflow performance analysis and worked calculation examples made for training the book brings fresh air and innovation to a long standing essential component in a well s lifecycle Covers essential gas lift design troubleshooting and the latest developments in R D Provides real world field experience and techniques to solve both onshore and offshore challenges Offers past and present analytical and operational techniques available in an easy to read manner Features information on computer utilization inflow and outflow performance analysis and worked calculation training examples Modelling and Experimentation in Two-Phase Flow Volfango Bertola,2003 This is an up to date review of recent advances in the study of two phase flows with focus on gas liquid flows liquid liquid flows and particle transport in turbulent flows The book is divided into several chapters which after introducing basic concepts lead the reader through a more complex treatment of the subjects The reader will find an extensive review of both the older and the more recent literature with abundance of formulas correlations graphs and tables A comprehensive though non exhaustive list of bibliographic references is provided at the end of each chapter The volume is especially indicated for researchers who would like to carry out experimental theoretical or computational work on two phase flows as well as for professionals who wish to learn more about this topic **Multiphase Flow in Wells** James P. Brill,Hemant Kumar Mukherjee,1999 **Two-phase Flow Modelling and Experimentation,** 1995 G. P. Celata,1995 *Mechanical Engineering and Applied Mechanics* Sugeng Supriadi,2015-04-30 Selected peer reviewed papers from the 13th Indonesia Conference of Mechanical Engineering October 15 16 2014 Depok Indonesia **Materials Science and Information Technology** Cai Suo Zhang,2012-01-03 Selected peer reviewed papers from the 2011 International Conference on Material Science and Information Technology MSIT 2011 September 16 18 2011 Singapore **Multiphase Flow Handbook** Efstathios Michaelides,Clayton T. Crowe,John D. Schwarzkopf,2016-10-26 The Multiphase Flow Handbook Second Edition is a thoroughly updated and reorganized revision of the late Clayton Crowe s work and provides a detailed look at the basic concepts and the wide range of applications in this important area of thermal

fluids engineering Revised by the new editors Efstathios E Stathis Michaelides and John D Schwarzkopf the new Second Edition begins with two chapters covering fundamental concepts and methods that pertain to all the types and applications of multiphase flow The remaining chapters cover the applications and engineering systems that are relevant to all the types of multiphase flow and heat transfer The twenty one chapters and several sections of the book include the basic science as well as the contemporary engineering and technological applications of multiphase flow in a comprehensive way that is easy to follow and be understood The editors created a common set of nomenclature that is used throughout the book allowing readers to easily compare fundamental theory with currently developing concepts and applications With contributed chapters from sixty two leading experts around the world the Multiphase Flow Handbook Second Edition is an essential reference for all researchers academics and engineers working with complex thermal and fluid systems **SPE Journal** ,2004

Proceedings : Western Regional Meeting Society of Petroleum Engineers (U.S.) Western Regional Meeting,1996

**Proceedings ... SPE Annual Technical Conference and Exhibition** Society of Petroleum Engineers (U.S.). Technical Conference and Exhibition,1996 **Prediction of Pressure Drop of Slug Flow in Vertical Pipes Using Mechanistic Model** Mohamad Fakhrol Radzi Zulkefli,2014 Due to the variability of flow pattern of gas liquid two phase flow and complexity of flow mechanism it is very difficult to seek a single model which is able to predict pressure drop and fit for any flow condition when the existing model of two phase flow pressure drop is used to predict the pressure of the conditions of producing gas well a large error occurs Therefore it is necessary based on the experimental data of gas water two phase flow to research the flow mechanism and discover the regular existing in the process of fluid property changing On the basis of the current two phase flow pressure drop model it is important to explore modified pressure loss model applicable for producing gas well with water to improve predictability of the pressure drop of gas wells and to provide the theory and technology guidance for development of gas reservoir with water Underbalanced drilling UBD has increased in recent years because of the many advantages associated with it These include increase in the rate of penetration and reduction of lost circulation and formation damage Drilling of deviated and horizontal wells also increased since recovery can be improved from a horizontal or a deviated well The drilling of deviated wells using UBD method will reduce several drilling related problems such as hole cleaning and formation damage Prediction of flow and pressure profiles while drilling underbalanced in such wells will help in designing and planning of the well The aim of this research is to predict the pressure drop of slug flow in the certain pressure in vertical pipes using mechanistic model and to study the behavior of the flow profile in the drillstring and the annulus under UBD conditions through the use of mechanistic two phase flow models Mechanistic two phase flow models is been used In this research to predict the liquid hold up for phase gas liquid slug flow which is important for the accurate calculations of the pressure drop In particular its evaluation is important for the vertical pipes since the liquid hold up in the slug body is the main contributor to the hydrostatic pressure drop which quite significant for the

verticals flows Further development of mechanistic models has allowed accurate prediction of wellbore pressure Many Underbalanced Drilling operations require the use of nitrified diesel as the drilling fluid Thus two phase flow will exist both in the drill pipe and the annulus      **Proceedings of the ASME Heat Transfer Division** ,1998      **Proceedings of the ASME Fluids Engineering Division Summer Meeting** American Society of Mechanical Engineers. Fluids Engineering Division. Summer Meeting,1996      **Gas Abstracts** ,1992

## Decoding **Mechanistic Modeling Of Gas Liquid Two Phase Flow In Pipes**: Revealing the Captivating Potential of Verbal Expression

In a time characterized by interconnectedness and an insatiable thirst for knowledge, the captivating potential of verbal expression has emerged as a formidable force. Its power to evoke sentiments, stimulate introspection, and incite profound transformations is genuinely awe-inspiring. Within the pages of "**Mechanistic Modeling Of Gas Liquid Two Phase Flow In Pipes**," a mesmerizing literary creation penned by way of a celebrated wordsmith, readers set about an enlightening odyssey, unraveling the intricate significance of language and its enduring impact on our lives. In this appraisal, we shall explore the book's central themes, evaluate its distinctive writing style, and gauge its pervasive influence on the hearts and minds of its readership.

<https://crm.allthingsbusiness.co.uk/public/uploaded-files/fetch.php/Playstation%205%20Productivity%20Planner%20Guide.pdf>

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