

HYSYS Tips and Tricks: User-Variables to calculate erosional velocity in dynamic simulation models

When modelling piping networks, especially in the presence of loops and parallel piping, HYSYS Dynamics can be easily used as a pressure-flow solver simulator (this was discussed in our article "Modelling Piping Networks – HYSYS Steady State, HYSYS Hydraulics or HYSYS Dynamics?"). However, one major flaw of using this methodology is that flow assurance calculations are not available in Dynamics. An erosion calculation is quite useful when modelling piping networks. This article suggests a methodology to correct this issue by setting up user variables in HYSYS and provides a step-by-step example including a sample of the required code.

User Variables

A user variable is a feature available in HYSYS that is very useful and will definitely help users take their simulations to the next level. The creative application of user variables in the calculation of various process parameters in a HYSYS case eliminates the need of downloading information from HYSYS to perform those calculations using spreadsheets.

Erosional Velocity

Multiphase flow (gas/liquid, gas/solid or a combination of both) at high velocities causes erosion in pipes and vessels due to the impact of liquid or solid particles over their inner walls. Because of this, the erosional velocity or the erosional velocity ratio (actual velocity / erosional velocity) is a key design parameter when sizing pipes and vessels under certain conditions. Erosional velocity can be calculated as indicated in the API RP 14E [3]:

$$v_e = \frac{C}{\sqrt{\rho_m}}$$

Where:

v_e : Erosional velocity (ft/s)

C : Empirical constant

ρ_m : Gas/liquid mixture density at flowing pressure and temperature (lb/ft³)

User Guide Hysys Dynamic

**Ibrahim Dincer,Adnan Midilli,Haydar
Kucuk**



User Guide Hysys Dynamic:

Integrated Design and Simulation of Chemical Processes Alexandre C. Dimian, Costin Sorin Bildea, Anton A. Kiss, 2014-09-18 This comprehensive work shows how to design and develop innovative optimal and sustainable chemical processes by applying the principles of process systems engineering leading to integrated sustainable processes with green attributes Generic systematic methods are employed supported by intensive use of computer simulation as a powerful tool for mastering the complexity of physical models New to the second edition are chapters on product design and batch processes with applications in specialty chemicals process intensification methods for designing compact equipment with high energetic efficiency plantwide control for managing the key factors affecting the plant dynamics and operation health safety and environment issues as well as sustainability analysis for achieving high environmental performance All chapters are completely rewritten or have been revised This new edition is suitable as teaching material for Chemical Process and Product Design courses for graduate MSc students being compatible with academic requirements world wide The inclusion of the newest design methods will be of great value to professional chemical engineers Systematic approach to developing innovative and sustainable chemical processes Presents generic principles of process simulation for analysis creation and assessment Emphasis on sustainable development for the future of process industries *Progress in Exergy, Energy, and the Environment* Ibrahim Dincer, Adnan Midilli, Haydar Kucuk, 2014-06-17 This thorough and highly relevant volume examines exergy energy and the environment in the context of energy systems and applications and as a potential tool for design analysis optimization It further considers their role in minimizing and or eliminating environmental impacts and providing for sustainable development In this regard several key topics ranging from the basics of the thermodynamic concepts to advanced exergy analysis techniques in a wide range of applications are covered Onshore Oilfield Surface Facilities: Process Safety Engineering Guide Kun Fang, 2025-07-24 This book focuses on oil and gas industry to systematically summarize the safety production operation design code and standards and advanced practice It aims to provide guidance for the safety engineering process of onshore oilfield surface facilities It is suitable for engineers engaged in the design of onshore oilfield surface facilities and can also be reference to researchers in related fields The basis of English translation of this book originally in Chinese was facilitated by artificial intelligence The content was later revised by the author for accuracy **Chemical Process Simulations using Aspen Hysys** Khalid W. Hameed, 2025-07-16 An intuitive guide to using Aspen HYSYS for chemical petrochemical and petroleum industry process simulations including interactive process flow diagrams In Chemical Process Simulations using Aspen Hysys distinguished lecturer Dr Khalid W Hameed delivers an up to date and authoritative discussion of the simulation and design of chemical petrochemical and petroleum industry processes using Aspen HYSYS The book includes coverage of many chemical engineering topics including fluid flow reactors unit operation of heat and mass transfer oil refinery process and control systems Readers will also find highly interactive

process flow diagrams for building and navigating through large simulations as well as A thorough introduction to the use of Aspen HYSYS for the chemical oil and petrochemical industries Skill development techniques for users of Aspen HYSYS and strategies for improving the accuracy of results Practical discussions of Dynamic State Simulation with explanations of how to install control systems for the process using flash separator gas processing and advanced process control such as ratio control cascade control and split range control Illustrative examples of Plant Wide Projects that demonstrate the ability of Aspen HYSYS to perform a full plant Perfect for research and development engineers in the fields of petrochemical chemical and petroleum engineering Chemical Process Simulations using Aspen HYSYS will also benefit researchers with an interest in the area

Design and Analysis of Liquid Hydrogen Technologies Ahmad K. Sleiti, Wahib A. Al-Ammari, 2024-04-02

Design and Analysis of Liquid Hydrogen Technologies Liquefaction Storage and Distribution offers readers a comprehensive guide to the development analysis design and assessment methodologies for liquid hydrogen From the fundamentals to the latest developments and current applications the book provides an extensive and systematic discussion of the design simulation and techno economic analysis methodologies supported by practical examples verified codes and innovative process designs The book provides a comprehensive overview of the liquid hydrogen economy followed by detailed advanced thermoeconomic exergoeconomic optimization and dynamic simulation models that are essential for the assessment of the current and future LH2 technologies The authors then identify current technological challenges and propose innovative solutions for LH2 technologies with a focus on the liquefaction plants and storage facilities In depth analyses are provided of the reliability safety and environmental impacts of the different stages of the LH2 supply transportation regasification and distribution To improve the economic feasibility of LH2 plants recent advanced energy integrated systems are discussed Potential market applications are considered and detailed techno economic assessments are provided Finally the book critically evaluates the future directions and prospective development of liquid hydrogen technologies regulations safety standards and new markets for liquid hydrogen applications Bringing together the latest information Design and Analysis of Liquid Hydrogen Technologies Liquefaction Storage and Distribution provides a valuable resource for students researchers scientists and engineers working in the hydrogen economy or involved in the processing design manufacturing quality control reliability safety systems and testing of cryogenic refrigeration and liquid hydrogen production storage and transportation Describes in detail the current operational and conceptual hydrogen liquefaction storage transportation regasification and distribution technologies Offers comprehensive analytical tools decision making tools and practical examples for the advanced modeling and simulation of liquid hydrogen plants Provides techno economic reliability safety and environmental impact analysis of liquid hydrogen technologies along with future prospects

The Chemical Engineer's Guide To Process Design and Industrial Excellence Dr. Manoj R Kadam, 2025-02-25

Process Automation Handbook Jonathan Love, 2007-12-22 This book distills into a single coherent handbook all the essentials of process automation at a

depth sufficient for most practical purposes The handbook focuses on the knowledge needed to cope with the vast majority of process control and automation situations In doing so a number of sensible balances have been carefully struck between breadth and depth theory and practice classical and modern technology and technique information and understanding A thorough grounding is provided for every topic No other book covers the gap between the theory and practice of control systems so comprehensively and at a level suitable for practicing engineers

European Symposium on Computer Aided Process Engineering - 12 J. Grievink, J. van Schijndel, 2002-04-29 This book contains 182 papers presented at the 12th Symposium of Computer Aided Process Engineering ESCAPE 12 held in The Hague The Netherlands May 26 29 2002 The objective of ESCAPE 12 is to highlight advances made in the development and use of computing methodologies and information technology in the area of Computer Aided Process Engineering and Process Systems Engineering The Symposium addressed six themes 1 Integrated Product 2 Process Synthesis 3 Process Dynamics 4 Manufacturing 5 Computational Technologies 6 Sustainable CAPE Education and Careers for Chemical Engineers These themes cover the traditional core activities of CAPE and also some wider conceptual perspectives such as the increasing interplay between product and process design arising from the often complex internal structures of modern products the integration of production chains creating the network structure of the process industry and optimization over life span dimensions taking sustainability as the ultimate driver

PEM Fuel Cells with Bio-Ethanol Processor Systems Marta S. Basualdo, Diego Feroldi, Rachid Outbib, 2011-10-30 An apparently appropriate control scheme for PEM fuel cells may actually lead to an inoperable plant when it is connected to other unit operations in a process with recycle streams and energy integration PEM Fuel Cells with Bio Ethanol Processor Systems presents a control system design that provides basic regulation of the hydrogen production process with PEM fuel cells It then goes on to construct a fault diagnosis system to improve plant safety above this control structure PEM Fuel Cells with Bio Ethanol Processor Systems is divided into two parts the first covers fuel cells and the second discusses plants for hydrogen production from bio ethanol to feed PEM fuel cells Both parts give detailed analyses of modeling simulation advanced control and fault diagnosis They give an extensive in depth discussion of the problems that can occur in fuel cell systems and propose a way to control these systems through advanced control algorithms A significant part of the book is also given over to computer aided engineering software tools that can be used to evaluate the dynamic performance of the overall plant PEM Fuel Cells with Bio Ethanol Processor Systems is intended for use by researchers and advanced students on chemical electrical electronic and mechanical engineering courses in which dynamics and control are incorporated with the traditional steady state coverage of flowsheet synthesis engineering economics and optimization

Advances in Neural Networks - ISSN 2005 Jun Wang, Xiaofeng Liao, Zhang Yi, 2005-05-04 The three volume set LNCS 3496 3497 3498 constitutes the refereed proceedings of the Second International Symposium on Neural Networks ISSN 2005 held in Chongqing China in May June 2005 The 483 revised papers presented were carefully

reviewed and selected from 1 425 submissions The papers are organized in topical sections on theoretical analysis model design learning methods optimization methods kernel methods component analysis pattern analysis systems modeling signal processing image processing financial analysis control systems robotic systems telecommunication networks incidence detection fault diagnosis power systems biomedical applications industrial applications and other applications **Recent Advances In Circuits And Systems** Nikos E Mastorakis,1998-10-12 Recent Advances in Circuits and Systems brings you a balanced state of the art presentation of the latest concepts methods algorithms techniques procedures and applications of the fascinating field of Circuits and Systems Written by eminent leading international experts the contributors provide up to date aspects of topics discussed and present fresh original insights into their own experience with Circuits and Systems The main aim of this book is to present most of the new trends and recent advances of the impressive evolution in the discipline of circuits and systems Special emphasis is given in the interaction between the classic areas of systems theory feedback control circuits design electronics etc and the modern techniques of computational intelligence neural networks genetic algorithms fuzzy logic and expert systems since this fertile interaction promises to open up new horizons in circuits and systems theory This book is composed of four parts Part I is devoted to Circuits and Electronics and also includes Power Systems Part II refers to Systems Theory and Control H infinity problems feedback control non linear systems robust stability and robust control multivariable systems hybrid systems and hydraulic systems Part III presents the latest developments in the Robotics theory and applications while Part IV is devoted to Computational Intelligence in Systems Theory

Proceedings of the ... Triennial World Congress of the International Federation of Automatic Control International Federation of Automatic Control,2003 Introduction to Software for Chemical Engineers Mariano Martín Martín,2025-03-24 The field of chemical engineering and its link to computer science is in constant evolution and engineers have an ever growing variety of tools at their disposal to tackle everyday problems Introduction to Software for Chemical Engineers Third Edition provides a quick guide to the use of various computer packages for chemical engineering applications It covers a range of software applications including Excel and general mathematical packages such as MATLAB MathCAD R and Python Coverage also extends to process simulators such as CHEMCAD HYSYS and Aspen equation based modeling languages such as gPROMS optimization software such as GAMS AIMS and Julia and specialized software like CFD or DEM codes The different packages are introduced and applied to solve typical problems in fluid mechanics heat and mass transfer mass and energy balances unit operations reactor engineering and process and equipment design and control This new edition is updated throughout to reflect software updates and new packages It emphasizes the addition of SimaPro due to the importance of life cycle assessment as well as general statistics software SPSS and Minitab that readers can use to analyze lab data The book also includes new chapters on flowsheeting drawing process control and LOOP Pro as well as updates to include Pyomo as an optimization platform reflecting current trends The text offers a global idea of the

capabilities of the software used in the chemical engineering field and provides examples for solving real world problems Written by leading experts this handbook is a must have reference for chemical engineers looking to grow in their careers through the use of new and improving computer software Its user friendly approach to simulation and optimization as well as its example based presentation of the software makes it a perfect teaching tool for both undergraduate and graduate level readers

Strategies to Enhance Environmental Security in Transition Countries Ruth N. Hull,Constantin-Horia Barbu,Nadezhda Goncharova,2007-05-02 This volume presents the main environmental security challenges facing transition countries as well as practical methods and approaches for addressing them which are equally applicable to all countries Coverage also details lesson learned as illustrated via research and case studies as well as issues related to metals in the environment

Environmental Assessment Manual Pacific Northwest Laboratory,1974

Chemical Engineering Design Ray Sinnott,Gavin Towler,2019-05-26 Chemical Engineering Design SI Edition is one of the best known and most widely used textbooks available for students of chemical engineering The enduring hallmarks of this classic book are its scope and practical emphasis which make it particularly popular with instructors and students who appreciate its relevance and clarity This new edition provides coverage of the latest aspects of process design operations safety loss prevention equipment selection and much more including updates on plant and equipment costs regulations and technical standards Includes new content covering food pharmaceutical and biological processes and the unit operations commonly used Features expanded coverage on the design of reactors Provides updates on plant and equipment costs regulations and technical standards Integrates coverage with Honeywell s UniSim software for process design and simulation Includes online access to Engineering s Cleopatra cost estimating software

Chemical Process Design and Simulation: Aspen Plus and Aspen Hysys Applications Juma Haydary,2019-01-23 A comprehensive and example oriented text for the study of chemical process design and simulation Chemical Process Design and Simulation is an accessible guide that offers information on the most important principles of chemical engineering design and includes illustrative examples of their application that uses simulation software A comprehensive and practical resource the text uses both Aspen Plus and Aspen Hysys simulation software The author describes the basic methodologies for computer aided design and offers a description of the basic steps of process simulation in Aspen Plus and Aspen Hysys The text reviews the design and simulation of individual simple unit operations that includes a mathematical model of each unit operation such as reactors separators and heat exchangers The author also explores the design of new plants and simulation of existing plants where conventional chemicals and material mixtures with measurable compositions are used In addition to aid in comprehension solutions to examples of real problems are included The final section covers plant design and simulation of processes using nonconventional components This important resource Includes information on the application of both the Aspen Plus and Aspen Hysys software that enables a comparison of the two software systems Combines the basic theoretical principles of

chemical process and design with real world examples Covers both processes with conventional organic chemicals and processes with more complex materials such as solids oil blends polymers and electrolytes Presents examples that are solved using a new version of Aspen software ASPEN One 9 Written for students and academics in the field of process design

Chemical Process Design and Simulation is a practical and accessible guide to the chemical process design and simulation using proven software **Advances in Neural Networks--ISNN ...** ,2005 **Process Modelling and Model Analysis** Ian T. Cameron,Katalin Hangos,2001-05-23 Process Modelling and Model Analysis describes the use of models in process engineering Process engineering is all about manufacturing of just about anything To manage processing and manufacturing systematically the engineer has to bring together many different techniques and analyses of the interaction between various aspects of the process For example process engineers would apply models to perform feasibility analyses of novel process designs assess environmental impact and detect potential hazards or accidents To manage complex systems and enable process design the behavior of systems is reduced to simple mathematical forms This book provides a systematic approach to the mathematical development of process models and explains how to analyze those models Additionally there is a comprehensive bibliography for further reading a question and answer section and an accompanying Web site developed by the authors with additional data and exercises Introduces a structured modeling methodology emphasizing the importance of the modeling goal and including key steps such as model verification calibration and validation Focuses on novel and advanced modeling techniques such as discrete hybrid hierarchical and empirical modeling Illustrates the notions tools and techniques of process modeling with examples and advances applications **Cleaner Treatment Technologies and Productions in The Energy Industry, 2nd edition** Jiang Bian,Xuwen Cao,Chuang Wen,Lin Teng,Zheng Li,2023-04-29 s the rapid development of the world s economy brought serious environmental problems the economy must accelerate industrial structure adjustment and development mode transformation to achieve sustainable development A cleaner production mode based on cleaner technology is a crucial way to solve the conflict between economic growth and environmental protection effectively In essence cleaner production is a kind of production mode in which the environmental strategy of overall prevention is adopted for the production process to reduce or eliminate their possible harm to human beings and the environment while fully meeting human needs and maximizing social and economic benefits Fossil energy and renewable energy have promoted the development of many emerging industries such as the automobile industry aerospace technology modern production and processing and modern transportation industry and preventing waste production while increasing efficiencies in the uses of energy is a crucial issue Specific measures include Using clean energy and raw materials Adopting advanced technology and equipment Comprehensive utilization Reducing pollution from the source Improving utilization efficiency Reducing or avoiding the generation and emission of pollutants in the process of production This Research Topic aims to report the most important and latest technological advances in cleaner treatment technologies

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