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1D and Multi-D Modeling Techniques for IC Engine Simulation Engine Modeling and Simulation Computer Simulation Of Compression-Ignition Engine Processes Simulation of a Hydrogen Internal Combustion Engine with Cryogenic Mixture Formation Simulations and Optical Diagnostics for Internal Combustion Engines Engine Modeling and Control Introduction to Modeling and Control of Internal Combustion Engine Systems Simulation and Optimization of Internal Combustion Engines Internal Combustion Engines Spark Ignition Internal Combustion Engine Modelling Using Matlab Mixture Formation in Internal Combustion Engines An Introduction to Thermodynamic Cycle Simulations for Internal Combustion Engines Internal Combustion Engine Principles - With Vehicle Applications Fuel Systems for IC Engines Internal Combustion Engines Charging the Internal Combustion Engine Modeling and Computer Simulation of Internal Combustion Engines Artificial Intelligence and Data Driven Optimization of Internal Combustion Engines Quasi-Dimensional Simulation of Spark Ignition Engines Internal Combustion Engines Advances in Internal Combustion Engine Research Advances in Internal Combustion Engines and Fuel Technologies Design and Simulation of Two-Stroke Engines IC Engines Natural Gas Combustion Modelling in IC Engine IC Engines Design and Simulation of Four-Stroke Engines Diesel Engine Transient Operation Internal Combustion Engines and Powertrain Systems for Future Transport 2019 Engine Testing Mathematical Simulation of Internal Combustion Engine Processes and Performance Including Comparisons with Experiment Numerical and Experimental Studies on Combustion Engines and Vehicles Advances in IC Engines and Combustion Technology Theory of Engine Manifold Design CFD Study on Hydrogen Engine Mixture Formation and Combustion Combustion for Power Generation and Transportation Miniature Internal Combustion Engines Internal Combustion Engine Modelling The Internal-combustion Engine in Theory and Practice The Internal-combustion Engine in Theory and Practice

1D and Multi-D Modeling Techniques for IC Engine Simulation

2020-04-06

1d and multi d modeling techniques for ic engine simulation provides a description of the most significant and recent achievements in the field of 1d engine simulation models and coupled 1d 3d modeling techniques including 0d combustion models quasi 3d methods and some 3d model applications

Engine Modeling and Simulation

2021-12-16

this book focuses on the simulation and modeling of internal combustion engines the contents include various aspects of diesel and gasoline engine modeling and simulation such as spray combustion ignition in cylinder phenomena emissions exhaust heat recovery it also explored engine models and analysis of cylinder bore piston stresses and temperature effects this book includes recent literature and focuses on current modeling and simulation trends for internal combustion engines readers will gain knowledge about engine process simulation and modeling helpful for the development of efficient and emission free engines a few chapters highlight the review of state of the art models for spray combustion and emissions focusing on the theory models and their applications from an engine point of view this volume would be of interest to professionals post graduate students involved in alternative fuels ic engines engine modeling and simulation and environmental research

Computer Simulation Of Compression-Ignition Engine Processes

2008

this book attempts to provide a simplified framework for the vast and complex map of technical material that exists on compression ignition engines and at the same time include sufficient details to convey the complexity of engine simulation the emphasis here is on the thermodynamics combustion physics and chemistry heat transfer and friction processes relevant to compression ignition engines with simplifying assumptions

Simulation of a Hydrogen Internal Combustion Engine with Cryogenic Mixture Formation

2019-10-11

this book focuses on combustion simulations and optical diagnostics techniques which are currently used in internal combustion engines the book covers a variety of simulation techniques including in cylinder combustion numerical investigations of fuel spray and effects of different fuels and engine technologies the book includes chapters focused on alternative fuels such as dee biomass alcohols etc it provides valuable information about alternative fuel utilization in ic engines use of combustion simulations and optical techniques in advanced techniques such as microwave assisted plasma ignition laser ignition etc are few other important aspects of this book the book will serve as a valuable resource for academic researchers and professional automotive engineers alike

Simulations and Optical Diagnostics for Internal Combustion Engines

2014-07-01

the increasing demands for internal combustion engines with regard to fuel consumption emissions and driveability lead to more actuators sensors and complex control functions a systematic implementation of the electronic control systems requires mathematical models from basic design through simulation to calibration the book treats physically based as well as models based experimentally on test benches for gasoline spark ignition and diesel compression ignition engines and uses them for the design of the different control functions the main topics are development steps for engine control stationary and dynamic experimental modeling physical models of intake combustion mechanical system turbocharger exhaust cooling lubrication drive train engine control structures hardware software actuators sensors fuel supply injection system camshaft engine control methods static and dynamic feedforward and feedback control calibration and optimization hil rcp control software development control of gasoline engines control of air fuel ignition knock idle coolant adaptive control functions control of diesel engines combustion models air flow and exhaust recirculation control combustion pressure based control hcci optimization of feedforward and feedback control smoke limitation and emission control this book is an introduction to electronic engine management with many practical examples measurements and research results it is aimed at advanced students of electrical mechanical mechatronic and control engineering and at practicing engineers in the field of combustion engine and automotive engineering

Engine Modeling and Control

2013-03-14

internal combustion engines still have a potential for substantial improvements particularly with regard to fuel efficiency and environmental compatibility these goals can be achieved with help of control systems modeling and control of internal combustion engines ice addresses these issues by offering an introduction to cost effective model based control system design for ice the primary emphasis is put on the ice and its auxiliary devices mathematical models for these processes are developed in the text and selected feedforward and feedback control problems are discussed the appendix contains a summary of the most important controller analysis and design methods and a case study that analyzes a simplified idle speed control problem the book is written for students interested in the design of classical and novel ice control systems

Introduction to Modeling and Control of Internal Combustion Engine Systems

2021-12-28

simulation and optimization of internal combustion engines provides the fundamentals and up to date progress in multidimensional simulation and optimization of internal combustion engines while it is impossible to include all the models in a single book this book intends to introduce the pioneer and or the often used models and the physics behind them providing readers with ready to use knowledge key issues useful modeling methodology and techniques as well as instructive results are discussed through examples readers will understand the fundamentals of these examples and be inspired to explore new ideas and means for better solutions in their studies and

work topics include combustion basis of ic engines mathematical descriptions of reactive flow with sprays engine in cylinder turbulence fuel sprays combustions and pollutant emissions optimization of direct injection gasoline engines and optimization of diesel and alternative fuel engines

Simulation and Optimization of Internal Combustion Engines

2014-10-10

this book presents the papers from the internal combustion engines performance fuel economy and emissions held in london uk this popular international conference from the institution of mechanical engineers provides a forum for ic engine experts looking closely at developments for personal transport applications though many of the drivers of change apply to light and heavy duty on and off highway transport and other sectors these are exciting times to be working in the ic engine field with the move towards downsizing advances in fie and alternative fuels new engine architectures and the introduction of euro 6 in 2014 there are plenty of challenges the aim remains to reduce both co2 emissions and the dependence on oil derivate fossil fuels whilst meeting the future more stringent constraints on gaseous and particulate material emissions as set by eu north american and japanese regulations how will technology developments enhance performance and shape the next generation of designs the book introduces compression and internal combustion engines applications followed by chapters on the challenges faced by alternative fuels and fuel delivery the remaining chapters explore current improvements in combustion pollution prevention strategies and data comparisons presents the latest requirements and challenges for personal transport applications gives an insight into the technical advances and research going on in the ic engines field provides the latest developments in compression and spark ignition engines for light and heavy duty applications automotive and other markets

Internal Combustion Engines

2002

a systematic control of mixture formation with modern high pressure injection systems enables us to achieve considerable improvements of the combustion pr ess in terms of reduced fuel consumption and engine out raw emissions however because of the growing number of free parameters due to more flexible injection systems variable valve trains the application of different combustion concepts within different regions of the engine map etc the prediction of spray and m ture formation becomes increasingly complex for this reason the optimization of the in cylinder processes using 3d computational fluid dynamics cfd becomes increasingly important in these cfd codes the detailed modeling of spray and mixture formation is a prerequisite for the correct calculation of the subsequent processes like ignition combustion and formation of emissions although such simulation tools can be viewed as standard tools today the predictive quality of the sub models is c stantly enhanced by a more accurate and detailed modeling of the relevant pr esses and by the inclusion of new important mechanisms and effects that come along with the development of new injection systems and have not been cons ered so far in this book the most widely used mathematical models for the simulation of spray and mixture formation in 3d cfd calculations are described and discussed in order to give the reader an introduction into the complex processes the book starts with a description of the fundamental mechanisms and categories of fuel jection spray break up and mixture formation in internal combustion engines

Spark Ignition Internal Combustion Engine Modelling Using Matlab

2006-09-28

this book provides an introduction to basic thermodynamic engine cycle simulations and provides a substantial set of results key features includes comprehensive and detailed documentation of the mathematical foundations and solutions required for thermodynamic engine cycle simulations the book includes a thorough presentation of results based on the second law of thermodynamics as well as results for advanced high efficiency engines case studies that illustrate the use of engine cycle simulations are also provided

Mixture Formation in Internal Combustion Engines

2015-10-19

the book is an introductory text on the subject of internal combustion engines intended for use in engineering courses at the senior or introductory graduate student level the focus is on describing the basic principles of engine operation on a broad basis to provide a foundation for further study research and development the goal is to describe the main variables involved in engine operation of different engine types and how their interaction determines engine performance topics included are general engine parameters thermodynamic cycles including simple engine simulation air exchange processes combustion in different engine types exhaust emissions engine control including mean value engine models pressure charging fuels and fuel systems balancing friction and heat transfer in addition methods to establish the connection between engine characteristics and vehicle performance in terms of acceleration maximum speed and fuel consumption are presented

An Introduction to Thermodynamic Cycle Simulations for Internal Combustion Engines

2017-10-08

this book presents the papers from the latest conference in this successful series on fuel injection systems for internal combustion engines it is vital for the automotive industry to continue to meet the demands of the modern environmental agenda in order to excel manufacturers must research and develop fuel systems that guarantee the best engine performance ensuring minimal emissions and maximum profit the papers from this unique conference focus on the latest technology for state of the art system design characterisation measurement and modelling addressing all technological aspects of diesel and gasoline fuel injection systems topics range from fundamental fuel spray theory component design to effects on engine performance fuel economy and emissions presents the papers from the imeche conference on fuel injection systems for internal combustion engines papers focus on the latest technology for state of the art system design characterisation measurement and modelling addressing all technological aspects of diesel and gasoline fuel injection systems topics range from fundamental fuel spray theory and component design to effects on engine performance fuel economy and emissions

Internal Combustion Engine Principles - With Vehicle

Applications

2012-03-06

this book covers all aspects of supercharging internal combustion engines it details charging systems and components the theoretical basic relations between engines and charging systems as well as layout and evaluation criteria for best interaction coverage also describes recent experiences in design and development of supercharging systems improved graphical presentations and most advanced calculation and simulation tools

Fuel Systems for IC Engines

1988

artificial intelligence and data driven optimization of internal combustion engines summarizes recent developments in artificial intelligence ai machine learning ml and data driven optimization and calibration techniques for internal combustion engines the book covers ai ml and data driven methods to optimize fuel formulations and engine combustion systems predict cycle to cycle variations and optimize after treatment systems and experimental engine calibration it contains all the details of the latest optimization techniques along with their application to ice making it ideal for automotive engineers mechanical engineers oems and r d centers involved in engine design provides ai ml and data driven optimization techniques in combination with computational fluid dynamics cfd to optimize engine combustion systems features a comprehensive overview of how ai ml techniques are used in conjunction with simulations and experiments discusses data driven optimization techniques for fuel formulations and vehicle control calibration

Internal Combustion Engines

2007-11-04

based on the simulations developed in research groups over the past years introduction to quasi dimensional simulation of spark ignition engines provides a compilation of the main ingredients necessary to build up a quasi dimensional computer simulation scheme quasi dimensional computer simulation of spark ignition engines is a powerful but affordable tool which obtains realistic estimations of a wide variety of variables for a simulated engine keeping insight the basic physical and chemical processes involved in the real evolution of an automotive engine with low computational costs it can optimize the design and operation of spark ignition engines as well as it allows to analyze cycle to cycle fluctuations including details about the structure of a complete simulation scheme information about what kind of information can be obtained and comparisons of the simulation results with experiments introduction to quasi dimensional simulation of spark ignition engines offers a thorough guide of this technique advanced undergraduates and postgraduates as well as researchers in government and industry in all areas related to applied physics and mechanical and automotive engineering can apply these tools to simulate cyclic variability potentially leading to new design and control alternatives for lowering emissions and expanding the actual operation limits of spark ignition engines

Charging the Internal Combustion Engine

1999

summary this book contains the papers presented at the imeche s internal combustion engines performance fuel economy and emissions conference held at the imeche london 8 9 december 2009 this conference the latest in the successful biannual series on internal combustion engines addresses drivers of change technological developments and advances in the latest research it examines developments for personal transport applications though many of the drivers of change apply to light and heavy duty on and off highway transport and other sectors the conference focuses on spark ignition engine technology for fuel economy engine downsizing design and analysis diesel engine design and analysis and fuels about the editors the institution of mechanical engineers imeche is one of the leading professional engineering institutions in the world contents si engines technology for fuel economy a comparison of inlet valve operating strategies in a single cylinder spark ignition engine future gasoline engine downsizing technologies co2 improvements and engine design considerations si engines downsizing design and analysis variable valve actuation enabled high efficiency gasoline engine a variable compression opposed piston si engine application of high precision absolute pressure sensors for gas exchange analysis diesel engines design and analysis effects of cooled and super cooled low pressure egr systems on the ld diesel engine performances effect of compression ratio on combustion stability and performance of a di diesel engine under cold conditions effect of charge density on emissions in a hd ltc diesel engine by retarding intake valve timing and rising boost pressure emissions control nox and particulates measures to improve the nox pm trade off for passenger car diesel engines at elevated engine load low particulate combustion development of the jcb dieselmax mid range off highway engine exhaust inorganic nanoparticle emissions from internal combustion engines fuels and diesel engines in cylinder fuel injection and combustion analysis on 2nd generation bio fuels in a single cylinder cr di diesel optical engine low nox low smoke operation of a diesel engine using a gasoline fuel dual fuel and low carbon hgvs using bio methane investigation of fuel properties and characterization of new generation alternative fuel for diesel engine low temperature combustion hydrogen homogeneous charge compression ignition hcci engine with dme as an ignition promoter hcci simulation of a non reciprocating internal combustion engine the effects of exhaust back pressure on conventional and low temperature diesel combustion fuels and si engines omnivore an automotive flex fuel 2 stroke engine with variable compression ratio variable charge trapping and direct fuel injection a study of gasoline alcohol blended fuels in a turbocharged disi engine the nature of superknock and its origins in si engines

Modeling and Computer Simulation of Internal Combustion Engines

2022-01-05

this book discusses all aspects of advanced engine technologies and describes the role of alternative fuels and solution based modeling studies in meeting the increasingly higher standards of the automotive industry by promoting research into more efficient and environment friendly combustion technologies it helps enable researchers to develop higher power engines with lower fuel consumption emissions and noise levels over the course of 12 chapters it covers research in areas such as homogeneous charge compression ignition hcci combustion and control strategies the use of alternative fuels and additives in combination with new combustion technology and novel approaches to recover the pumping loss in the spark ignition engine the book will serve as a valuable resource for academic researchers and professional automotive engineers alike

Artificial Intelligence and Data Driven Optimization of Internal Combustion Engines

2013-08-20

this book highlights the important need for more efficient and environmentally sound combustion technologies that utilise renewable fuels to be continuously developed and adopted the central theme here is two fold internal combustion engines and fuel solutions for combustion systems internal combustion engines remain as the main propulsion system used for ground transportation and the number of successful developments achieved in recent years is as varied as the new design concepts introduced it is therefore timely that key advances in engine technologies are organised appropriately so that the fundamental processes applications insights and identification of future development can be consolidated in the future and across the developed and emerging markets of the world the range of fuels used will significantly increase as biofuels new fossil fuel feedstock and processing methods as well as variations in fuel standards continue to influence all combustion technologies used now and in coming streams this presents a challenge requiring better understanding of how the fuel mix influences the combustion processes in various systems the book allows extremes of the theme to be covered in a simple yet progressive way

Quasi-Dimensional Simulation of Spark Ignition Engines

2009-11-20

design and simulation of two stroke engines is a unique hands on information source the author having designed and developed many two stroke engines offers practical and empirical assistance to the engine designer on many topics ranging from porting layout to combustion chamber profile to tuned exhaust pipes the information presented extends from the most fundamental theory to pragmatic design development and experimental testing issues chapters cover introduction to the two stroke engine combustion in two stroke engines computer modeling of engines reduction of fuel consumption and exhaust emissions reduction of noise emission from two stroke engines and more

Internal Combustion Engines

2017-11-29

measurement and testing of engines explained with modern techniques using computers mathematical modeling and electronic instrumentation recent research developments like combustion flame propagation engine heat transfer scavenging and engine emissi

Advances in Internal Combustion Engine Research

2013-03-20

in present research the combustion of cng is simulated using the kinetic reaction mechanisms in internal combustion ic engines these mechanisms are primarily investigated to predict the formation of gaseous pollutant such as carbon monoxide co oxides nitrogen no no2 and ammonia nh3 due to combustion of cng in ic engine in spite of the existence of some discrepancies among the simulation profiles mechanism iv consisting of 208 elementary reactions 72 species exhibits the closer agreement with the experimental data under the given engine operating conditions this

mechanism is containing the reactions feasible at range of temperature conditions of low below 800 k to high 1000 k in this mechanism major primary types of reactions include unimolecular initiations bimolecular initiations beta scissions oxidation branching metatheses combination and dismutation on the basis of this it is concluded that mechanism iv is consisting of those kinds elementary reactions both primary secondary type involved in the combustion of cng in the automobile engine and is capable of predicting the formation of the selected criteria gaseous pollutants

Advances in Internal Combustion Engines and Fuel Technologies

1996-02-01

this book introduces the reader to fundamentals of engine combustion processes and pollutant formation combustion thermodynamics conceptual and thermodynamic engine combustion models fluid motion in the cylinder the conventional and advanced combustion systems such as for disc cai and hcci engines are discussed for a wider coverage on the subject emission measurement alternative propulsion systems are included in this text laser based and other combustion diagnostic techniques are outlined to introduce readers to modern combustion research methods the book attempts to present theoretical aspects and the practices including the latest developments in engine and emission control technology

Design and Simulation of Two-Stroke Engines

2007

this book provides design assistance with the actual mechanical design of an engine in which the gas dynamics fluid mechanics thermodynamics and combustion have been optimized so as to provide the required performance characteristics such as power torque fuel consumption or noise emission

IC Engines

2011-07

traditionally the study of internal combustion engines operation has focused on the steady state performance however the daily driving schedule of automotive and truck engines is inherently related to unsteady conditions in fact only a very small portion of a vehicle s operating pattern is true steady state e g when cruising on a motorway moreover the most critical conditions encountered by industrial or marine engines are met during transients too unfortunately the transient operation of turbocharged diesel engines has been associated with slow acceleration rate hence poor driveability and overshoot in particulate gaseous and noise emissions despite the relatively large number of published papers this very important subject has been treated in the past scarcely and only segmentally as regards reference books merely two chapters one in the book turbocharging the internal combustion engine by n watson and m s janota mcmillan press 1982 and another one written by d e winterbone in the book the thermodynamics and gas dynamics of internal combustion engines vol ii edited by j h horlock and d e winterbone clarendon press 1986 are dedicated to transient operation both books now out of print were published a long time ago then it seems reasonable to try to expand on these pioneering works taking into account the recent technological advances and particularly the global concern about environmental pollution which has intensified the research on transient diesel

engine operation typically through the transient cycles certification of new vehicles

Natural Gas Combustion Modelling in Ic Engine

2010

with the changing landscape of the transport sector there are also alternative powertrain systems on offer that can run independently of or in conjunction with the internal combustion ic engine this shift has actually helped the industry gain traction with the ic engine market projected to grow at 4.67% cagr during the forecast period 2019-2025 it continues to meet both requirements and challenges through continual technology advancement and innovation from the latest research with this in mind the contributions in internal combustion engines and powertrain systems for future transport 2019 not only cover the particular issues for the ic engine market but also reflect the impact of alternative powertrains on the propulsion industry the main topics include engines for hybrid powertrains and electrification ic engines fuel cells e machines air path and other technologies achieving performance and fuel economy benefits advances and improvements in combustion and ignition systems emissions regulation and their control by engine and after treatment developments in real world driving cycles advanced boosting systems connected powertrains ai electrification opportunities energy conversion and recovery systems modified or novel engine cycles ic engines for heavy duty and off highway internal combustion engines and powertrain systems for future transport 2019 provides a forum for ic engine fuels and powertrain experts and looks closely at developments in powertrain technology required to meet the demands of the low carbon economy and global competition in all sectors of the transportation off highway and stationary power industries

IC Engines

1999-08-15

engine testing electrical hybrid ic engine and power storage testing and test facilities fifth edition covers the requirements of test facilities dealing with e vehicle systems and different configurations and operations chapters dealing with the rigging and operation of units under test uut are updated to include electric motor based systems test cell services and thermo dynamics control module and system testing using advanced in the loop xil methods are described including powertrain component integrated simulation and testing all other chapters dealing with test cell design installation safety and use together with the cell support systems in ic engine testing are updated to reflect current developments and research covers multiple technical disciplines for anyone required to design modify or operate an automotive powertrain test facility provides tactics on the development of electrical and hybrid powertrains and energy storage systems presents coverage of the housing and testing of automotive battery systems in addition to the use of virtual testing in the form of x in the loop throughout the powertrain s development and test life

Design and Simulation of Four-Stroke Engines

2009-03-10

the matters discussed and presented in the chapters of this book cover a wide spectrum of topics and research methods commonly used in the field of engine combustion technology and vehicle functional systems this book contains the results

of both computational analyses and experimental studies on jet and reciprocating combustion engines as well heavy duty onroad vehicles special attention is devoted to research and measures toward preventing the emission of harmful exhaust components reducing fuel consumption or using unconventional methods of engine fueling or using renewable and alternative fuels in different applications some technical improvements in design and control of vehicle systems are also presented

Diesel Engine Transient Operation

2020-03-09

this book comprises select peer reviewed proceedings of the 26th national conference on ic engines and combustion ncicec 2019 which was organised by the department of mechanical engineering national institute of technology kurukshetra under the aegis of the combustion institute indian section ciis the book covers latest research and developments in the areas of combustion and propulsion exhaust emissions gas turbines hybrid vehicles ic engines and alternative fuels the contents include theoretical and numerical tools applied to a wide range of combustion problems and also discusses their applications this book can be a good reference for engineers educators and researchers working in the area of ic engines and combustion

Internal Combustion Engines and Powertrain Systems for Future Transport 2019

2020-10-14

this book together with its companion volume design techniques for engine manifolds wave action methods for ic engines reports the significant developments that have occurred over the last twenty years and shows how mature the calculation of one dimensional flow has become in particular they show how the application of finite volume techniques results in more accurate simulations than the traditional method of characteristics and gives the further benefit of more rapid and more robust calculations contents include introduction governing equations numerical methods future developments in modelling unsteady flows in engine manifolds simple boundaries at pipe ends intra pipe boundary conditions turbocharging components the application of wave action methods to design and analysis of flow in engines

Engine Testing

1964

this research monograph presents both fundamental science and applied innovations on several key and emerging technologies involving fossil and alternate fuel utilization in power and transport sectors from renowned experts in the field some of the topics covered include autoignition in laminar and turbulent nonpremixed flames langevin simulation of turbulent combustion lean blowout lbo prediction through symbolic time series analysis lasers and optical diagnostics for next generation ic engine development exergy destruction study on small di diesel engine and gasoline direct injection the book includes a chapter on carbon sequestration and optimization of enhanced oil and gas recovery the contents of this book will be useful to researchers and professionals working on all aspects on combustion

Mathematical Simulation of Internal Combustion Engine

Processes and Performance Including Comparisons with Experiment

2020-11-26

model engineers have been making models of internal combustion engines since the invention of the real thing but it has always been surrounded by a mystique and a perceived difficulty that has put many people off

Numerical and Experimental Studies on Combustion Engines and Vehicles

2020-08-18

Advances in IC Engines and Combustion Technology

2000

Theory of Engine Manifold Design

2004

CFD Study on Hydrogen Engine Mixture Formation and Combustion

2017-01-20

Combustion for Power Generation and Transportation

2007

Miniature Internal Combustion Engines

1999-05-01

Internal Combustion Engine Modelling

1968

The Internal-combustion Engine in Theory and Practice

1968

The Internal-combustion Engine in Theory and Practice

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