OMB No. 5704292314968

Numerical Simulation Of Low Pressure Die Casting Aluminum

palnik niskocisnieniowy (low pressure burner), CFD Fluent, numerical simulation Direct Numerical Simulation of an oil drop impact on a water film Direct numerical simulation of a wing section at Re=500,000 What is numerical simulation? Direct numerical simulation of a transonic wing section at moderate Reynolds numbers Future Aircraft Engineering - The Numerical Simulation Point of Zero Pressure Change 8 5 Numerical Simulation Lesson 8: Compressible Fluid Flow Aleks Calculating pressure-volume work Force Balance on Inclined Manometer SALSA3D and ProCAST HPDC casting numerical simulation 5:1 Fluid Dynamics - Bernoulli Equation, Pressure Measurement, Free Jets Mod-01 Lec-24 Lecture-24 Uriel Frisch - Is Direct Numerical Simulation of Turbulence Entering into The High-Precision Era? Direct Numerical Simulation of a wing profile Numerical Simulation — Lesson 4 Numerical Simulation of a Recorder (with Sound!) Numerical Simulation of Hemorrhage in Human Injury Fundamentals of Numerical Simulation Gulf Stream Separation - numerical simulation Numerical simulation of a Rising compound droplet in an immiscible two-liquid pool. Direct Numerical Simulation of a turbulent Rayleigh-Bénard convection at very low Prandtl number Numerical simulation of combustion chamber JABEN INDIA,#INTRODUCING BOOK.#NUMERICAL SIMULATION APPROACHES AND COMPLEX ELECTROMAGNETIC PROBLEMS 2D Navier-Stokes numerical simulation Direct numerical simulations of sheared thermal convection Numerical simulation of Incompressible fluid flow (backstep)

Low-temperature Sintering and Fabrication Research of Ceramics and Numerical Simulation on Elastic, Pressure Drop and Heat Transfer Properties of Open Cell Foams

Past, Present and Future Developments

Theory, Computation, and Numerical Simulation

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Numerical Simulation for Next Generation Thermal Power Plants

A Practical Introduction

Numerical Simulation of Low-Density Shock-Wave Interactions

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Hypersonic Vehicles

KENYON EZRA

Low-temperature Sintering and Fabrication Research of Ceramics and Numerical Simulation on Elastic, Pressure Drop and Heat Transfer Properties of Open Cell Foams Springer Nature
The book provides highly specialized researchers and practitioners with a major contribution to mathematical models' developments for energy systems. First, dynamic process simulation models based on mixture flow and two-fluid models are developed for combined-cycle power plants, pulverised coal-fired power plants, concentrated solar power plant and municipal waste incineration. Operation data, obtained from different power stations, are used to investigate the capability of dynamic models to predict the behaviour of real processes and to analyse the influence of modeling assumptions on simulation results. Then, a computational fluid dynamics (CFD) simulation programme, so-called DEMEST, is developed. Here, the fluid-solid, particle-particle and particle-wall interactions are modeled by tracking all individual particles. To this purpose, the deterministic Euler-Lagrange/Discrete Element Method (DEM) is applied and further improved. An emphasis is given to the determination of inter-phase values, such as volumetric void fraction, momentum and heat transfers, using a new procedure known as the offset-method and to the particle-grid method allowing the refinement of the grid resolution independently from particle size. Model validation is described in detail. Moreover, thermochemical reaction models for solid fuel combustion are developed based on quasi-single-phase, two-fluid and Euler-Lagrange/MP-PIC models. Measurements obtained from actual power plants are used for validation and comparison of the developed numerical models.
Past, Present and Future Developments Springer Science & Business Media

In this translation of the German edition, the authors provide insight into the numerical simulation of fluid flow. Using a simple numerical method as an expository example, the individual steps of scientific computing are presented: the derivation of the mathematical model; the discretization of the model equations; the development of algorithms; parallelization; and visualization of the computed data. In addition to the treatment of the basic equations for modeling laminar, transient flow of viscous, incompressible fluids - the Navier-Stokes equations - the authors look at the simulation of free surface flows; energy and chemical transport; and turbulence. Readers are enabled to write their own flow simulation program from scratch. The variety of applications is shown in several simulation results, including 92 black-and-white and 18 color illustrations. After reading this book, readers should be able to understand more enhanced algorithms of computational fluid dynamics and apply their new knowledge to other scientific fields.
Theory, Computation, and Numerical Simulation IntechOpen
Numerical simulation is a technique of major importance in various technical and scientific fields. Whilst engineering curricula now include training courses dedicated to it, numerical simulation is still not well-known in some economic sectors, and even less so among the general public. Simulation involves the mathematical modeling of the real world, coupled with the computing power offered by modern technology. Designed to perform virtual experiments, digital simulation can be considered as an "art of prediction". Embellished with a rich iconography and based on the testimony of researchers and engineers, this book shines a light on this little-known art. It is the second of two volumes and gives examples of the uses of numerical simulation in various scientific and technical fields: agriculture, industry, Earth and universe sciences, meteorology and climate studies, energy, biomechanics and human and social sciences.
DOT-TSC-OST. Springer Science & Business Media
High Hydrostatic Pressure Processing (HHPP) is a novel non-thermal food processing technology for producing safe, high quality food products, with minimum detrimental effects of thermal processing such as loss of original flavor and color. The high pressure range used for processing food products is 100 to 1000 MPa. Clams are high pressure processed in the range of 200-350 MPa and fruit juices between 300-600 MPa. Spores, found mainly in low acid foods, and prions need even higher pressures for inactivation. When pressure is applied on a food product using liquid medium, adiabatic heat generation occurs due to compression of the pressurizing medium and the food product, which results in increase in their temperatures. This increase in temperature is different for different foods. For example, water heats up by 2-3°C per 100 MPa increase in pressure. Oils and fats heat more (6-9°C) due to their higher compressibility, lower thermal conductivity, and lower heat capacity. In a high pressure process, the heat generated by adiabatic compression is continuously dissipated to the thick metal wall of the vessel during pressurization and pressure hold stages. The heat loss at the wall and the natural convection flow near the vessel wall give rise to non-uniform temperature distribution within the pressurization medium. Therefore, the objective of this research was to carry out numerical simulation of thermal transport in pressurizing medium (water) during HHPP

(at room temperature and higher initial temperature) to predict the temperature distribution. Numerical predictions were validated using experimental data. The impact of the response time of the high pressure thermocouple assembly on the measured transient temperature response was taken into account. Results obtained from the numerical simulation showed that the temperature distribution in the pressurizing medium became non-uniform during the high pressure process and this non-uniformity increased with increasing initial temperatures. Also, increasing the vessel size and inserting an insulating sleeve in the vessel decreased the non-uniformity in temperature. Non-uniformity in temperature in the pressurizing medium can lead to non-uniform microbial inactivation and is of most relevance when a combination of high pressure and high temperature is used to inactivate spores.

Numerical Simulation for Next Generation Thermal Power Plants

Springer

Pressure wave supercharger is an application of wave rotor technology that utilizes compression waves produced by high-pressure engine exhaust gas to compress the fresh intake air within the channels. The phenomena within the wave rotor channels are governed by compression and expansion waves initiated when the channel ends are periodically exposed to differing pressure ports. Two incoming fluids are brought into contact for a very short amount of time to facilitate efficient energy and momentum transfer, thereby exchanging pressure dynamically between the fluids by means of unsteady pressure waves. Since the energy transfer is based on unsteady pressure waves, correct matching of waves and ports is essential for optimum results. Mistiming of the waves in the channels is detrimental to the efficient exchange of pressure and low-pressure exhaust scavenging, which ensures minimum exhaust gas recirculation. Due to varying speed and load conditions of the unit to be supercharged, it is not always possible to maintain the rotor speed constant at the design point. To mitigate the effects of wave mistiming due to varying speed, a well-designed combination of wall-pockets was used in Comprex® pressure wave supercharger. The wall-pockets are the recesses provided in the endplates of pressure wave superchargers to create necessary pressure zones at desired locations. This thesis details an extensive qualitative and computational investigation of the performance of pressure wave superchargers with pockets. Numerical simulations of pressure wave superchargers have been performed using the wave rotor analysis codes employed at the Combustion and Propulsion Research Laboratory at IUPUI. This work also pays close attention to inspecting the numerical schemes and modeling of different physical phenomena used in each code. A comparative verification of the wave rotor analysis codes has been conducted to ensure that the same fundamental numerical scheme is correctly implemented in each code. The issue of low-pressure scavenging has been demonstrated by simulating the four-port (pocketless) pressure wave supercharger operating at lower speeds. The wall-pockets have been modeled using a simple lumped volume technique. The gas state in the lumped volume of pockets is estimated using the continuity and energy equations such that the net mass and energy fluxes between each pocket and the wave rotor channels are close to zero. The lumped volume models of pockets have been implemented in the four-port wave rotor configurations to simulate the pressure wave superchargers with pockets. The simulation results show that the pockets assist to maintain sufficient pressure in the desired zones to facilitate proper low-pressure scavenging during lower rotor speed operations. The Comprex simulation results have been observed to be in good agreement with experimental data and qualitative analysis. Specific observations on the performance of each code and comprehensive simulation results have been presented.

A Practical Introduction BoD – Books on Demand

An unsteady, multiblock, Reynolds Averaged Navier Stokes solver based on Runge-Kutta scheme and Pseudo-time step for turbo-machinery applications was developed. The code was validated and assessed against analytical and experimental data. It was used to study a variety of physical mechanisms of unsteady, three-dimensional, turbulent, transitional, and cooling flows in compressors and turbines. Flow over a cylinder has been used to study effects of numerical aspects on accuracy of prediction of wake decay and transition, and to modify K-epsilon models. The following simulations have been performed: (a) Unsteady flow in a compressor cascade: Three low Reynolds number turbulence models have been assessed and data compared with Euler/boundary layer predictions. Major flow features associated with wake induced transition were predicted and studied; (b) Nozzle wake-rotor interaction in a turbine: Results compared to LDV data in design and off-design conditions, and cause and effect of unsteady flow in turbine rotors were analyzed; (c) Flow in the low-pressure turbine: Assessed capability of the code to predict transitional, attached and separated flows at a wide range of low Reynolds numbers and inlet freestream turbulence intensity. Several turbulence and transition models have been employed and comparisons made to experiments; (d) leading edge film cooling at compound angle: Comparisons were made with experiments, and the flow physics of the associated vortical structures were studied; and (e) Tip leakage flow in a turbine. The physics of the secondary flow in a rotor was studied and sources of loss identified. Chernobrovkin, A. A. and Lakshiminarayana, B. Glenn Research Center NAG3-1736; NAG3-2025; RTOP 523-26-33...

Numerical Simulation of Low-Density Shock-Wave Interactions John Wiley & Sons

Nowadays mathematical modeling and numerical simulations play an important role in life and natural science. Numerous researchers are working in developing different methods and techniques to help understand the behavior of very complex systems, from the brain activity with real importance in medicine to the turbulent flows with important applications in physics and engineering. This book presents an overview of some models, methods, and numerical computations that are useful for the applied research scientists and mathematicians, fluid tech engineers, and postgraduate students.

BoD – Books on Demand

The practical importance of turbulence led the U.K. Royal Academy of Engineering to launch an Initiative on Turbulence, the most important outcome of which was the definition and agreement of the 1999 Newton Institute Research Programme on Turbulence. The main aim of the- month programme, held at the institute in Cambridge, was to bring together the mathematics and engineering communities involved in the turbulence area to address the many problems and to map out future strategy. As a part of the Research Programme, a Symposium on Direct and Large-Eddy Simulation was jointly organised with ERCOFfAC through their Large-Eddy Simulation Interest Group and took place in May 1999. Two previous ERCOFf AC Workshops had already taken place on these closely related varieties of turbulence simulation, at The University of Surrey in 1994 and at Universite Joseph Fourier, Grenoble in 1996. The Symposium at Cambridge was therefore the third in the ERCOFTAC series, enhanced by the presence of leading figures in the field from Europe and the USA who were resident at INI for that period of the Research Programme. Professors M. Germano, A. Leonard, J. Jimenez, R. Kerr and S. Sarkar gave the invited lectures, text versions of which will be found in this volume. As occurred at the previous two ERCOFT AC workshops, there were almost one hundred participants mostly from Europe but including some from Japan and the USA, including on this occasion resident scientists of the INI Research Programme.

Numerical Simulation of Low-Density Shock-Wave Interactions Createspace Independent Publishing Platform

The first publication of its kind in the field, this book describes comprehensively and systematically radio-frequency (rf) capacitive gas discharges of intermediate and low pressure and their application to gas laser excitation and to plasma processing. Text presents the physics underlying rf discharges along with techniques for obtaining such discharges, experimental methods and results, and theoretical and numerical modeling findings. Radio-Frequency Capacitive Discharges is written by well-known specialists in the field, authors of many theoretical and experimental works. They provide simple and clear discussions of complicated physical phenomena. A complete review on the state of the art is included. This interesting new book can be used as a textbook for students and postgraduates and as a comprehensive guidebook by specialists.

Proceedings of the Isaac Newton Institute Symposium / ERCOFTAC Workshop held in Cambridge, U.K., 12–14 May 1999 Springer

This book discusses water resources management in Romania from a hydrological perspective, presenting the latest research developments and state-of-the-art knowledge that can be applied to efficiently solve a variety of problems in integrated water resources management. It focuses on a wide range of water resources issues – from hydrology and water quantity, quality and supply to flood protection, hydrological hazards and ecosystems, and includes case studies from various watersheds in Romania. As such, the book appeals to researchers, practitioners and graduates as well as to anybody interested in water resources management.

Numerical Simulation in Fluid Dynamics Createspace Independent Publishing Platform

Numerical Simulations of Physical and Engineering Process is an edited book divided into two parts. Part I devoted to Physical Processes contains 14 chapters, whereas Part II titled Engineering Processes has 13 contributions. The book handles the recent research devoted to numerical simulations of physical and engineering systems. It can be treated as a bridge linking various numerical approaches of two closely inter-related branches of science, i.e. physics and engineering. Since the numerical simulations play a key role in both theoretical and application oriented research, professional reference books are highly needed by pure research scientists, applied mathematicians, engineers as well post-graduate students. In other words, it is expected that the book will serve as an effective tool in training the mentioned groups of researchers and beyond.

Water Resources Management in Romania Springer

This book systematically introduces readers to the simulation theory and techniques of multiple media for unconventional tight reservoirs. It summarizes the macro/microscopic heterogeneities; the features of multiscale multiple media; the characteristics of complex fluid properties; the occurrence state of continental tight oil and gas reservoirs in China; and the complex flow characteristics and coupled production mechanism under unconventional development patterns. It also discusses the simulation theory of multiple media for unconventional tight oil and gas reservoirs; mathematic model of flow through discontinuous multiple media; geological modeling of discrete multiscale multiple media; and the simulation of multiscale, multiphase flow regimes and multiple media. In addition to the practical application of simulation and software for unconventional tight oil and gas, it also explores the development trends and prospects of simulation technology. The book is of interest to scientific researchers and technicians engaged in the development of oil and gas reservoirs, and serves as a reference resource for advanced graduate students in fields related to petroleum.

Numerical Simulation of Vortex Generating Jets in Zero and Adverse Pressure Gradients Springer Nature

Numerical Simulations of Physical and Engineering Process is an edited book divided into two parts. Part I devoted to Physical Processes contains 14 chapters, whereas Part II titled Engineering Processes has 13 contributions. The book handles the recent research devoted to numerical simulations of physical and engineering systems. It can be treated as a bridge linking various numerical approaches of two closely inter-related branches of science, i.e. physics and engineering. Since the numerical simulations play a key role in both theoretical and application oriented research, professional reference books are highly needed by pure research scientists, applied mathematicians, engineers as well post-graduate students. In other words, it is expected that the book will serve as an effective tool in training the mentioned groups of researchers and beyond.

A Framework for the Direct Numerical Simulation of Phase Change Processes of Water at Low Temperature and Pressure

CRC Press

This book deals with numerical simulations and computations of the turbulent flow around high-lift configurations commonly used in aircraft. It is devoted to the Computational Fluids Dynamics (CFD) method using full Navier-Stokes solvers typically used in the simulation of high-lift configuration. With the increase of computational resources in the aeronautical industry, the computation of complex flows such as the aerodynamics of high-lift configurations has become an active field not only in academic but also in industrial environments. The scope of the book includes applications and topics of interest related to the simulation of high-lift configurations such as: lift and drag prediction, unsteady aerodynamics, low Reynolds effects, high performance computing, turbulence modelling, flow feature visualization, among others. This book gives a description of the state-of-the-art of computational models for simulation of high-lift configurations. It also shows and discusses numerical results and validation of these computational models. Finally, this book is a good reference for graduate students and researchers interested in the field of simulation of high-lift configurations.

Fluid Dynamics

SIAM

This book addresses nearly all aspects of the state of the art in LES & DNS of turbulent flows, ranging from flows in biological systems and the environment to external aerodynamics, domestic and centralized energy production, combustion, propulsion as well as applications of industrial interest. Following the advances in increased computational power and efficiency, several contributions are devoted to LES & DNS of challenging applications, mainly in the area of turbomachinery, including flame modeling, combustion processes and aeroacoustics. The book includes work presented at the tenth Workshop on 'Direct and Large-Eddy Simulation' (DLES-10), which was hosted in Cyprus by the University of Cyprus, from May 27 to 29, 2015. The goal of the workshop was to establish a state of the art in DNS, LES and related techniques for the computation and modeling of turbulent and transitional flows. The book is of interest to scientists and engineers, both in the early stages of their career and at a more senior level.

Numerical Simulations BoD – Books on Demand

Numerical simulations of particle image velocimetry (PIV) experiments conducted with vortex generating jets (VGJs) on a flat plate, at a Reynolds number based on plate length of 50,000, were performed for three flow conditions using a time-accurate hybrid Navier-Stokes solver. Time-averaged steady blowing of angled jets, subjected to a zero pressure gradient, yielded excellent agreement with the PIV data in terms of vortex formation and strength. Observed flow features include primary and secondary vortices, where the primary vortex eventually dominates the downstream region. A shell wall structure, created by smaller vortical structures surrounding the developing vortices, was also observed. A pulsed jet in a zero pressure gradient was then initialized from a no-control case. A qualitative comparison between averaged experimental and instantaneous numerical results was performed with good agreement in terms of the convected size and distance of the wake. Analysis of the instantaneous numerical flow field agreed well with various flow visualization experiments describing the formation of "kidney" vortices. Various indicators point to the production of a primary vortex by the reduced mass flow of the pulsed jet. Finally, an adverse pressure gradient was applied, inducing a laminar separation zone on the plate. A pulsed angled jet induced strong spanwise vortices in the separated shear layer which appear to weaken the separation zone and allow the bulk jet fluid to flush the remaining low-momentum fluid out of the domain. It is reasonable to assume that reduced blowing ratios and duty cycles would produce similar shear layer vortices and comparable loss reductions. Influences of both turbulent transition and dominant vortical structures were observed, though the spanwise shear layer vortices appear to be critical to the laminar separation reduction scenarios observed in this study.

Preconditioning for Numerical Simulation of Low Mach Number Three-dimensional Viscous Turbomachinery Flows

Springer Nature
This thesis focuses on the numerical simulation of Low-Tension-Gas (LTG) process, that involves the injection of surfactant and gas to generate and propagate foam for mobility control, and to mobilize the residual oil to waterflood by reducing the interfacial tension between oil and water. This EOR process, is an alternative to surfactant-polymer process and is applicable to challenging conditions including tight formations, high temperature and high salinity reservoirs where polymer implementation is not feasible due to physical and/or economic constraints. In this study, the experimental data used for numerical simulation involve tight carbonate rock with high formation salinity. For the numerical simulation study, a LTG model developed by the Uni- versity of Texas at Austin and incorporated into the compositional equation- of-state CMG/GEM simulator is utilized. The model includes the modeling of IFT reduction, surfactant partitioning, relative permeability, foam, and ad- sorption. In some case, a numerical simulation model may involve a large number of uncertain parameters, which often exceeds the experimental data available. Hence, there may exist more than one combination of the parameters that provide a good agreement between the model and the experiments. Therefore, a numerical simulation study is undertaken in order to develop a methodology for determining the LTG model parameters through a series of simulations and data-fitting of strategically selected experimental data to reduce the non- uniqueness of the problem while preserving the physics of the process. Low capillary number water-oil relative permeability parameters are determined through matching of waterflood experimental data, which is a pre- liminary procedure of LTG flooding. In addition, the reference foam mobility reduction factor, the dry-out function, and the gas relative permeability curve are estimated through matching of foam quality tests. Thereafter, a sensitivity analysis of the remaining uncertain parameters is performed to investigate the significance of the parameters on the oil recovery and pressure drop. Data- fitting of the LTG flood experimental data is then performed to determine es- timations for the rest of the parameter space, including surfactant adsorption, dispersivity, intermediate capillary number and associated oil-water relative permeability curves, oil-gas curvature, and the rest of the foam parameters. In conclusion, this thesis provides a methodology for estimating rela- tive permeability, foam strength, adsorption and dispersivity parameters for LTG simulation. These findings will be proven useful for understanding LTG flooding behavior in EOR processes.

Numerical Simulation Study of Low-Tension-Gas (LTG) Flooding for Enhanced Oil Recovery in Tight Formations BoD – Books on Demand
This book will interest researchers, scientists, engineers and

graduate students in many disciplines, who make use of mathematical modeling and computer simulation. Although it represents only a small sample of the research activity on numerical simulations, the book will certainly serve as a valuable tool for researchers interested in getting involved in this multidisciplinary field. It will be useful to encourage further experimental and theoretical researches in the above mentioned areas of numerical simulation.

Hypersonic Vehicles Trans Tech Publications Ltd

In the aviation field there is great interest in high-speed vehicle design. Hypersonic vehicles represent the next frontier of passenger transportation to and from space. However, several design issues must be addressed, including vehicle aerodynamics and aerothermodynamics, aeroshape design optimization, aerodynamic heating, boundary layer transition, and so on. This book contains valuable contributions focusing on hypervelocity aircraft design. Topics covered include hypersonic aircraft aerodynamic and aerothermodynamic design, especially aeroshape design optimization, computational fluid dynamics, and scramjet propulsion. The book also discusses high-speed flow issues and the challenges to achieving the dream of affordable hypersonic travel. It is hoped that the information contained herein will allow for the development of safe and efficient hypersonic vehicles.

Numerical Simulation of Complex Turbomachinery Flows

Numerical Simulation of Low-pressure Explosive Combustion in Compartment FiresNumerical Simulations of Physical and Engineering Processes

A numerical simulation has been constructed to obtain a detailed, quantitative estimate of the electromagnetic fields generated in a recently-proposed collective accelerator scheme for electrons. The code treats the secondary electrons by particle simulation and the beam dynamics by a time-dependent envelope model. The simulation gives a fully relativistic description of secondary electrons moving in selfconsistent electromagnetic fields. The calculations are made using coordinates t, x, y, z for the electrons and t, ct-z, r for the axisymmetric electromagnetic fields and currents. Code results showing the axial electric field dependence on the configuration of the ultrashort U.V. laser pulse will be given. 4 refs., 4 figs.

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