Indoor Thermal Comfort Perception A Questionnaire Approach Focusing On Children Springerbriefs In Applied Sciences And Technology | bf712b1b7b5d923feb28158b2aa29f85

Ergonomics for Improved Productivity

Advances in Physical Ergonomics & Human Factors

This book deals with indoor environmental quality (IEQ), which encompasses diverse factors that affect human life inside a building. These factors include indoor air quality (IAQ), lighting, acoustics, drinking water, ergonomics, electromagnetic radiation, and so on. Enhanced environmental quality can improve the quality of life and productivity of the occupants, increase the resale value of the building, and minimize the penalties on building owners. The book covers an overview of IEQ and its research progress, IAQ and its monitoring, the best indoor illumination scenes, IEQ in healthcare buildings, and acoustic comfort in residential buildings and places of worship. This book is expected to benefit undergraduate and postgraduate students, researchers, teachers, practitioners, policy makers, and every individual who has a concern for healthy life.

Energy and Thermal Management, Air Conditioning, Waste Heat Recovery

Understanding Urban Metabolism addresses the gap between the bio-physical sciences and urban planning and illustrates the advantages of accounting for urban metabolism issues in urban design decisions. Urban metabolism considers a city as a system, and distinguishes between energy and material flows as its components. Based on research from the BRIDGE...
project, this book deals with how the urban surface exchanges and transforms energy, water, carbon and pollutants in cities. This book also introduces a new method for evaluating how planning alternatives can modify the physical flows of urban metabolism components and how environmental and socioeconomic components interact. The inclusion of sustainability principles into urban planning provides an opportunity to place the new knowledge provided by bio-physical sciences at the centre of the planning process, but there is a strong need to bridge knowledge and practice, as well as for a better dissemination of research results and exchange of best practice. This book meets that need and provides the reader with the necessary tools to integrate an understanding of urban metabolism into urban planning practice.

**Historic Indoor Microclimate of the Heritage Buildings**

This book highlights the present scenario of energy demand and power generation technologies in tropical countries. The tropics are well known to receive direct sunlight. Furthermore, different than four-season countries, tropical countries have a continuous summer-like season, and therefore, they are rich in clean energy sources, like solar and biomass. Home to 40% of the world’s population, the demand for energy in these countries keeps increasing. With the present serious global concern on the environment, the choice of power generation is no doubt the cleanest possible resources. This book delves into the opportunity that various tropical countries have in pursuing environmentally friendly power generation systems.

**Smart Energy Control Systems for Sustainable Buildings**

The volumes includes selected and reviewed papers from the 1st ETA Conference on Energy and Thermal Management, Air Conditioning and Waste Heat Recovery in Berlin, December 1-2, 2016. Experts from university, public authorities and industry discuss the latest technological developments and applications for energy efficiency. Main focus is on automotive industry, rail and aerospace.

**Human Thermal Environments**

“Provides three levels of standardized protocols for assessing building performance that identify what, how, and how often to measure in six performance categories: energy, water, thermal comfort, indoor air quality, lighting, and acoustics. Such protocols give feedback when performance does not match design intent and lend credibility to performance claims”--Provided by publisher.


As the century begins, natural resources are under increasing pressure, threatening public health and development. As a result, the balance between man and nature has been disrupted, with climatic changes whose effects are starting to be irreversible. Due to the relationship between the quality of the indoor built environment and its energy demand, thermal comfort issues are still relevant in the disciplinary debate. This is also because the indoor environment has a potential impact on occupants’ health and productivity, affecting their physical and psychological conditions. To achieve a sustainable compromise in terms of comfort and energy requirements, several challenging questions must be answered with regard to design, technical, engineering, psychological, and physiological issues and, finally, potential interactions with other IEQ issues that require a holistic way to conceive the building envelope design. This Special Issue collected original research and review articles on innovative designs, systems, and/or control domains that can enhance thermal comfort, work productivity, and wellbeing in a built environment, along with works considering the integration of human factors in buildings’ energy performance.
ICESSD 2019

Offering readers essential insights into the relationship between ancient buildings, their original and current indoor microclimates, this book details how the (generally) virtuous relationship between buildings and their typical microclimate changed due to the introduction of new heating, ventilation, and air conditioning (HVAC) systems in historic buildings. The new approach to the study of their Historic Indoor Microclimate (HIM) put forward in this book is an essential component to monitoring and evaluating building and artefact conservation. Highlighting the advantages of adopting an indoor microclimatic approach to the preservation of existing historic materials by studying the original conditions of the buildings, the book proposes a new methodology linking the preservation/restoration of the historic indoor microclimate with diachronic analysis for the optimal preservation of historic buildings. Further, it discusses a number of frequently overlooked topics, such as the simple and well-coordinated opening and closing of windows (an example extracted from a real case study). In turn, the authors elaborate the concept of an Historic Indoor Microclimate (HIM) based on “Original Indoor Microclimate” (OIM), which proves useful in identifying the optimal conditions for preserving the materials that make up historic buildings. The book’s main goal is to draw attention to the advantages of an indoor microclimatic approach to the preservation of existing historic materials/manufacture, by studying the original conditions of the buildings. The introduction of new systems in historic buildings not only has a direct traumatic effect on the actual building and its components, but also radically changes one of its vital immaterial elements: the Indoor Microclimate. Architects, restorers and engineers will find that the book addresses the monitoring of the indoor microclimate in selected historic buildings that have managed to retain their original state due to the absence of new HVAC systems, and reflects on the advantages of a renewed attention to these aspects.

Passive Methods as a Solution for Improving Indoor Environments

There is widespread interest in the way that smart energy control systems, such as assessment and monitoring techniques for low carbon, nearly-zero energy and net positive buildings can contribute to a Sustainable future, for current and future generations. There is a turning point on the horizon for the supply of energy from finite resources such as natural gas and oil become less reliable in economic terms and extraction become more challenging, and more unacceptable socially, such as adverse public reaction to ‘fracking’. Thus, in 2016 these challenges are having a major influence on the design, optimisation, performance measurements, operation and preservation of: buildings, neighbourhoods, cities, regions, countries and continents. The source and nature of energy, the security of supply and the equity of distribution, the environmental impact of its supply and utilization, are all crucial matters to be addressed by suppliers, consumers, governments, industry, academia, and financial institutions. This book entitled ‘Smart Energy Control Systems for Sustainable Buildings’ contains eleven chapters written by international experts based on enhanced conference papers presented at the Sustainability and Energy in Buildings International conference series. This book will be of interest to University staff and students; and also industry practioners.

Indoor Environmental Quality

This book sheds light on environmental control in buildings from the 17th century onwards. Even before building services became a hallmark of buildings, in order to address increasing sanitary and comfort needs, pioneering experiences had contributed to improve design skills of professionals. After long being determined by passive features, indoor climate became influenced by installations and plants, representing the most significant shift of paradigm in the modern age’s construction history. This change was not without consequences, and the book presents contributions showing the deep connection between architectural design, comfort
requirements and environmental awareness throughout the 19th century. Taking into account the differences between different European countries, the book is a valuable resource for architects, designers and heritage professionals who are interested in environmental design, enabling them to develop a deeper knowledge of heritage in order to address to climate demands, particularly going towards a future in which energy savings and fuel consumption reduction will dictate our behaviour. It includes contributions by leading international experts: Melanie Bauernfeind, Marco Cofani, Lino Vittorio Bozzetto, Emmanuelle Gallo, Alberto Grimoldi, Dean Hawkes, Angelo Giuseppe Landi, Mattias Legnér, Oriel Prizeman, and Henrik Schoenefeldt.

**Exergy for A Better Environment and Improved Sustainability**

Winner of the Choice Outstanding Academic Titles of 2010 award. Ensuring that buildings are healthy and comfortable for their occupants is a primary concern of all architects and building engineers. This highly practical handbook will help make that process more efficient and effective. It begins with a guide to how the human body and senses react to different indoor environmental conditions, together with basic information on the parameters of the indoor environment and problems that can occur. It then moves on to give a background to the development of the study and control of the indoor environment, examining the main considerations (including thermal, lighting, indoor air and sound-related aspects) for a healthy and comfortable indoor environment and discussing the drivers for change in the field. The final section presents a new approach towards health and comfort in the indoor environment, where meeting the wishes and demands of the occupants with a holistic strategy becomes the overriding priority. The book is filled with useful facts, figures and analysis, and practical methods that designers who are keen to assess and improve the user experience of their buildings will find invaluable.

**Energy Performance in Buildings and Quality of Life**

Buildings allow several kinds of human activity: work, eat, sleep, play, etc., and they have a role in determining quality of life: ugly and uncomfortable buildings can be the worst place to live. The energy performance of buildings has a special role in improving and guaranteeing quality of life because it concerns architectural design, energy cost, consumption and energy poverty, and thermal comfort—both indoor and outdoor. Following a multidisciplinary approach, we present several case studies and articles about the correlation between building and quality of life. The included research highlights the relationship between BEP and quality of life in terms of wellbeing and thermal comfort and household smartness following UE Directive 844/2018, as well as the reduction of energy poverty and the impact of buildings on the environment and global warming. Also in this book is a city-scale study that attempts to evaluate the effect of climate change on building performance and building energy efficiency mapping and, moreover, reports some cases of indoor environment quality as well as thermal comfort in nearly zero energy buildings; finally, detailed scientific literature on energy poverty and outdoor wellbeing quality of life are presented.

**The Indoor Environment Handbook**

Our responses to our thermal environment have a considerable effect on our performance and behavior, not least in the realm of work. There has been considerable scientific investigation of these responses and formal methods have been developed for environmental evaluation and design. In recent years these have been developed to the extent that detailed national and international standards of practice have now become feasible. This new edition of Ken Parson’s definitive text brings us back up to date. He covers hot, moderate and cold environments, and defines these in terms of six basic parameters: air temperature, radiate temperature, humidity, air velocity, clothing worn, and the person’s activity. There is a focus on the principles and
practice of human response, which incorporates psychology, physiology and environmental physics with applied ergonomics. Water requirements, computer modeling and computer-aided design are brought in, as are current standards. Special populations, such as the aged or disabled and specialist environments such as those found in vehicles are also considered. This book continues to be the standard text for the design of environments for humans to live and work safely, comfortably and effectively, and for the design of materials which help the same people cope with their environments.

Understanding Urban Metabolism

The purpose of this study is to develop a Learner Thermal Comfort Protocol (LTCP) for the assessment of thermal comfort in naturally ventilated public school classrooms occupied by primary learners aged between 7 and 14 years and to establish whether there is a relationship between the thermal comfort standards (ASHRAE 55-2004 and ISO 7730-2005) and the learners’ perception thereof. The study tests the LTCP on two primary school case studies in Mamelodi Township, City of Tshwane (CoT), South Africa, by following the adaptive or field study method to collect quantitative data from the classroom and the learners. The classrooms’ actual temperature is measured and recorded by HOBO pendant data loggers while the learners’ thermal comfort perception is surveyed using questionnaires. The actual classroom indoor temperatures are compared to the ASHRAE 55 and ISO 7730 standard temperature range recommendations of ±22°C to ±27°C, based on the heat balance model, and ±20°C to ±27°C temperature range based on the context related adaptive model. To establish whether there is a relationship between standards and learners’ perception, the learners’ perception results are compared to the predicted percentage that occupants would find acceptable. This predicted percentage is based on the heat balance model (i.e. 80%) and adaptive model (i.e. 80% - 90%).

The results indicate that the indoor temperature range did not meet the recommended temperature range of either of the thermal comfort models. However, the thermal perception scale shows that the indoor temperatures were accepted by most of the learners. A relationship between the learners’ perception, the thermal comfort standards’ recommended temperature range and predicted percentage of acceptance was established. However, a wider temperature range is suggested for the thermal comfort assessment of classrooms located in the South African climate. This study will contribute to the body of knowledge on thermal comfort in schools and provide the Department of Basic Education (DBE) with an assessment tool for the evaluation of school classroom indoor environments.

Selected Papers from IEEE ICASI 2019

When used appropriately, building performance simulation has the potential to reduce the environmental impact of the built environment, to improve indoor quality and productivity, as well as to facilitate future innovation and technological progress in construction. Since publication of the first edition of Building Performance Simulation for Design and Operation, the discussion has shifted from a focus on software features to a new agenda, which centres on the effectiveness of building performance simulation in building life cycle processes. This new edition provides a unique and comprehensive overview of building performance simulation for the complete building life cycle from conception to demolition, and from a single building to district level. It contains new chapters on building information modelling, occupant behaviour modelling, urban physics modelling, urban building energy modelling and renewable energy systems modelling. This new edition keeps the same chapter structure throughout including learning objectives, chapter summaries and assignments. Moreover, the book: • Provides unique insights into the techniques of building performance modelling and simulation and their application to performance-based design and operation of buildings and the systems which service them. • Provides readers with the essential concepts of computational support of performance-based design and operation. • Provides examples of how to use building simulation techniques for practical design, management and operation, their limitations and
future direction. It is primarily intended for building and systems designers and operators, and postgraduate architectural, environmental or mechanical engineering students.

**Thermal Comfort**

This book presents selected papers from the 11th International Symposium on Heating, Ventilation and Air Conditioning (ISHVAC 2019), with a focus on HVAC techniques for improving indoor environment quality and the energy efficiency of heating and cooling systems. Presenting inspiration for implementing more efficient and safer HVAC systems, the book is a valuable resource for academic researchers, engineers in industry, and government regulators.

**Building Performance Simulation for Design and Operation**

This multi-disciplinary book presents the most recent advances in exergy, energy, and environmental issues. Volume 1 focuses on fundamentals in the field and covers current problems, future needs, and prospects in the area of energy and environment from researchers worldwide. Based on selected lectures from the Seventh International Exergy, Energy and Environmental Symposium (IEEES7-2015) and complemented by further invited contributions, this comprehensive set of contributions promote the exchange of new ideas and techniques in energy conversion and conservation in order to exchange best practices in "energetic efficiency". Included are fundamental and historical coverage of the green transportation and sustainable mobility sectors, especially regarding the development of sustainable technologies for thermal comforts and green transportation vehicles. Furthermore, contributions on renewable and sustainable energy sources, strategies for energy production, and the carbon-free society constitute an important part of this book. Exergy for Better Environment and Sustainability, Volume 1 will appeal to researchers, students, and professionals within engineering and the renewable energy fields.

**Urban Science and Engineering**

The monitoring of indoor air pollutants in a spatio-temporal basis is challenging. A key element is the access to local (i.e., indoor residential, workplace, or public building) exposure measurements. Unfortunately, the high cost and complexity of most current air pollutant monitors result in a lack of detailed spatial and temporal resolution. As a result, individuals in vulnerable groups (children, pregnant, elderly, and sick people) have little insight into their personal exposure levels. This becomes significant in cases of hyper-local variations and short-term pollution events such as instant indoor activity (e.g., cooking, smoking, and dust resuspension). Advances in sensor miniaturization have encouraged the development of small, inexpensive devices capable of estimating pollutant concentrations. This new class of sensors presents new possibilities for indoor exposure monitoring. This Special Issue invites research in the areas of the triptych: indoor air pollution monitoring, indoor air modeling, and exposure to indoor air pollution. Topics of interest for the Special Issue include, but are not limited to, the following: low-cost sensors for indoor air monitoring; indoor particulate matter and volatile organic compounds; ozone-terpene chemistry; biological agents indoors; source apportionment; exposure assessment; health effects of indoor air pollutants; occupant perception; climate change impacts on indoor air quality.

**Effects of Partition on Thermal Comfort, Indoor Air Quality, Energy Consumption, and Perception in Air-conditioned Building**

The 5th IEEE International Conference on Applied System Innovation 2019 (IEEE ICASI 2019, https://2019.icasi-conf.net/), which was held in Fukuoka, Japan, on 11–15 April, 2019, provided a unified communication platform for a wide range of topics. This Special Issue entitled “Selected Papers from IEEE ICASI 2019” collected nine excellent papers presented on the applied
sciences topic during the conference. Mechanical engineering and design innovations are academic and practical engineering fields that involve systematic technological materialization through scientific principles and engineering designs. Technological innovation by mechanical engineering includes information technology (IT)-based intelligent mechanical systems, mechanics and design innovations, and applied materials in nanoscience and nanotechnology. These new technologies that implant intelligence in machine systems represent an interdisciplinary area that combines conventional mechanical technology and new IT. The main goal of this Special Issue is to provide new scientific knowledge relevant to IT-based intelligent mechanical systems, mechanics and design innovations, and applied materials in nanoscience and nanotechnology.

Indoor Thermal Comfort Perception

This volume throws light on the Sick Building Syndrome in Libraries and other public buildings, and the extent to which it is influenced by the internal environment of libraries. One of the signs of this disease is that the person suffers from a set of symptoms closely related to his/her presence in the building, without the identification of any clear causes, and his/her relief of these symptoms when he/she are out of the building. Hence, the book sheds on the extent to which the interior environment impacts upon the health of the people, and the extent to which this is reflected in their performance. The book can be used for teaching, research, and professional reference. It concludes with the recommendation that is essential to observe environmental dimensions when designing library and public buildings, taking into consideration the expected impact of SBS in library and public buildings on people. The significance of the book derives from the fact that it is the first of its kind to examine the issue of the interior environment and SBS of library and public building worldwide.

Adaptive Thermal Comfort: Foundations and Analysis

Building in Hot and Humid Regions

We are delighted to introduce The Proceedings of the International Conference on Environmental Science and Sustainable Development in 2019. This conference has taken place with the theme “The Strengthening of Sustainable Development Goals (SDGs) in Southeast Asia”. Environmental problems are dynamics and complex that needs the analytical and decision making instruments which can accommodate these characteristics. Environmental science is an interdisciplinary science that delivered to understand complex and dynamic interactions in environmental systems. Studies in Environmental Sciences involves various fields of science which enable the formulation of efforts to solve environmental problems in a holistic and comprehensive way for its sustainability. Sustainable development is a dynamic process in environmental science that includes the process of utilizing natural resources, the direction of investment, the orientation of technological development and institutional change to address the environmental problems. The conference brought together a number of environmental experts from various disciplines, as well as practitioners, students and lecturers. Meanwhile, with a total of 38 papers, then all papers in this proceeding are divided into several sub-topics, i.e.: Ecosystem And Biodiversity Conservation; Environmental Planning And Management; Water And Waste Management; Governance, Culture, and Politics; Sustainable Energy And Renewable Energy; Spatial Planning And Regional Analysis; Community Engagement; Social Movement And Environmental; and Strengthening Of Sustainable Development Goals. We hope that the valuable work and discussion during this proceedings will lead to the initiatives and innovations in getting the Strengthening sustainable development goals, especially in solving environmental problems.

Low Energy Low Carbon Architecture
Current Standards for Indoor Air Temperature are inappropriate in many regions of the world. This forces designers to use highly serviced buildings to achieve air temperatures that accord with the standards to the detriment of the local and global environment. Standards for Thermal Comfort brings together contributions from around the world, reflecting new approaches to the setting of standards which can apply to all climates and cultures.

Cities and Cultural Landscapes

Performance Measurement Protocols for Commercial Buildings

There has been widespread dissatisfaction with accepted models for predicting the conditions that people will find thermally comfortable in buildings. These models require knowledge about clothing and activity, but can give little guidance on how to quantify them in any future situation. This has forced designers to make assumptions about people’s future behaviour based on very little information and, as a result, encouraged static design indoor temperatures. This book is the second in a three volume set covering all aspects of Adaptive Thermal Comfort. The first part narrates the development of the adaptive approach to thermal comfort from its early beginnings in the 1960s. It discusses recent work in the field and suggests ways in which it can be developed and modelled. Such models can be used to set dynamic, interactive standards for thermal comfort which will help overcome the problems inherited from the past. The second part of the volume engages with the practical and theoretical problems encountered in field studies and in their statistical analysis, providing guidance towards their resolution, so that valid conclusions may be drawn from such studies.

Transforming Markets in the Built Environment

This book reports on the state of the art in physical ergonomics and addresses the design of products, processes, services, and work systems to ensure they are productive, safe, and enjoyable for people to use. The human body’s responses to physical and physiological work demands, strain injuries from repetition, vibration, force, and posture are the most common types of issues examined, along with their design implications. The book explores a wide range of topics in physical ergonomics, including the consequences of repetitive motion, materials handling, workplace safety, the usability of portable devices, design, working postures, and the work environment. Mastering physical ergonomics and safety engineering concepts is fundamental to creating products and systems that people can safely and conveniently use, as well as avoiding stresses and minimizing the risk of accidents. Based on the AHFE 2018 Conference on Physical Ergonomics and Human Factors, held on July 21–25, 2018, in Orlando, Florida, USA, this book provides readers with a comprehensive perspective on the current challenges in physical ergonomics, which is a critical aspect in the design of any human-centered technological system, and for factors influencing human performance.

Standards for Thermal Comfort

This book focuses on human adaptive thermal comfort in the building environment and the balance between reducing building air conditioning energy and improving occupants’ thermal comfort. It examines the mechanism of human thermal adaptation using a newly developed adaptive heat balance model, and presents pioneering findings based on an online survey, real building investigation, climate chamber experiments, and theoretical models. The book investigates three critical issues related to human thermal adaptation: (i) the dynamics of human thermal adaptation in the building environment; (ii) the basic rules and effects of human physiological acclimatization and psychological adaptation; and (iii) a new, adaptive, heat balance model describing behavioral adjustment, physiological acclimatization, psychological adaptation, and physical improvement effects. Providing the basis for establishing a more
Getting Older and Getting Colder

Places are locations of value where psychological and cultural needs are satisfied. Human relationships with particular environments play a key role in motivating, developing, and nurturing the life of societies. Undifferentiated space becomes ‘place’ as we understand it better and its built and natural forms become endowed with value. However, misunderstanding the critical importance of heritage locations, particularly based on rejection of local and regional distinctiveness, has often led to their destruction. Featuring essays from across central Europe and beyond, and aimed at practitioners, decision makers and concerned citizens alike, this book raises awareness about the responsibility that we bear for every action taken that modifies the formal and socio-cultural context. Potentially, these actions can negatively impact the cultural landscape. Learning to recognize the essential value of heritage to the ‘place-ness’ of our cities and landscapes is vital in helping us to preserve and enjoy their intrinsic beauty and cultural importance.

The Dynamics and Mechanism of Human Thermal Adaptation in Building Environment

This book presents an in-depth analysis covering climatic and weather conditions, house and building development history, construction methods and technologies, and environmental conditions. It provides relevant house and building information and highlights recent advances in hot and humid regions, as well as developments in other regions that are relevant to hot and humid climates. The countries in hot and humid regions, which include the tropical countries, the Middle Eastern countries around the Mediterranean, and many countries of Central Asia and Africa, are home to some of the most challenging conditions in the world in terms of house and building design and construction, and in terms of maintaining indoor thermal comfort and air quality in an energy-efficient way. The book’s respective chapters, prepared by expert contributors, cover essential concepts, designs, and construction methodologies for houses and commercial buildings. As such, the book offers a valuable resource for undergraduate and graduate students in architecture and engineering, house and building designers, and building sciences researchers. Building contractors, manufacturers and distributors of building equipment and devices, and government policymakers and legislators will also benefit from the information provided in this book.

Indoor Air Quality

Building Physics

This open access book is based on work from the COST Action RESTORE - Rethinking Sustainability TOwards a Regenerative Economy, and highlights how sustainability in buildings, facilities and urban governance is crucial for a future that is socially just, ecologically restorative, and economically viable, for Europe and the whole planet. In light of the search for fair solutions to the climate crisis, the authors outline the urgency for the built environment sector to implement adaptation and mitigation strategies, as well as a just transition. As shown in the chapters, this can be done by applying a broader framework that enriches places, people, ecology, culture, and climate, at the core of the design task - with a particular emphasis on the benefits towards health and resilient business practices. This book is one step on the way to a paradigm shift towards restorative sustainability for new and existing buildings. The authors want to promote forward thinking and multidisciplinary knowledge, leading to solutions that celebrate the richness of design creativity. In this vision, cities of the future will enhance users'
experience, health and well-being inside and outside of buildings, while reconciling anthropic ecosystems and nature. A valuable resource for scientists and students in environmental sciences and architecture, as well as policy makers, practitioners and investors in urban and regional development.

**Sick Building Syndrome**

Providing a methodology for evaluating indoor thermal comfort with a focus on children, this book presents an in-depth examination of children’s perceptions of comfort. Divided into two sections, it first presents a history of thermal comfort, the human body and environmental parameters, common thermal comfort indexes, and guidelines for creating questionnaires to assess children’s perceptions of indoor thermal comfort. It then describes their understanding of the concepts of comfort and energy, and the factors that influence that perception. In this context, it takes into account the psychological and pedagogical aspects of thermal comfort judgment, as well as architectural and environmental characteristics and equips readers with the knowledge needed to effectively investigate children’s perspectives on environmental ergonomics. The research field of indoor thermal comfort adopts, on the one hand, physical parameter measurements and comfort indexes (e.g. Predicted Mean Vote (PMV) or adaptive comfort), and on the other, an ergonomic assessment in the form of questionnaires. However the latter can offer only limited insights into the issue of comfort, as children often use different terms than adults to convey their experience of thermal comfort. The book aims to address this lack of understanding with regard to children’s perceptions of indoor thermal comfort. The book is intended for HVAC engineers and researchers, architects and researchers interested in thermal comfort and the built environment. It also provides a useful resource for environmental psychologists, medical and cognitive researchers.

**Applications of the Universal Thermal Climate Index UTCI in Biometeorology**

The fundamental function of buildings is to provide safe and healthy shelter. For the fortunate they also provide comfort and delight. In the twentieth century comfort became a ‘product’ produced by machines and run on cheap energy. In a world where fossil fuels are becoming ever scarcer and more expensive, and the climate more extreme, the challenge of designing comfortable buildings today requires a new approach. This timely book is the first in a trilogy from leaders in the field which will provide just that. It explains, in a clear and comprehensible manner, how we stay comfortable by using our bodies, minds, buildings and their systems to adapt to indoor and outdoor conditions which change with the weather and the climate. The book is in two sections. The first introduces the principles on which the theory of adaptive thermal comfort is based. The second explains how to use field studies to measure thermal comfort in practice and to analyze the data gathered. Architects have gradually passed responsibility for building performance to service engineers who are largely trained to see comfort as the ‘product’, designed using simplistic comfort models. The result has contributed to a shift to buildings that use ever more energy. A growing international consensus now calls for low-energy buildings. This means designers must first produce robust, passive structures that provide occupants with many opportunities to make changes to suit their environmental needs. Ventilation using free, natural energy should be preferred and mechanical conditioning only used when the climate demands it. This book outlines the theory of adaptive thermal comfort that is essential to understand and inform such building designs. This book should be required reading for all students, teachers and practitioners of architecture, building engineering and management – for all who have a role in producing, and occupying, twenty-first century adaptive, low-carbon, comfortable buildings.

**Adaptive Thermal Comfort: Principles and Practice**

Research has demonstrated that temperature and relative humidity substantially influence
overall perceptions of indoor air quality (Fang, Clausen, & Fanger, 1998). This finding places temperature quality as a high priority, especially for vulnerable adults over 60. Temperature extremes and fluctuation, as well as the perception of those conditions, affect physical performance, thermal comfort and health of older adults (Chatonnet & Cabanac, 1965, pp. 185-6; Fumiharu, Watanabe, Park, Shephard, & Aoyagi, 2005; Heijs & Stringer, 1988). The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and the International Organization for Standardization (ISO) have developed thermal-comfort standards for working-age, healthy individuals. None of these standards address the physiological and psychological needs of older adults (ASHRAE Standard 55, 2010; ISO-7730, 2005). This dissertation investigates the impacts of thermal conditions on self-reported health and perceived comfort for older adults, hypothesizing that warmer and more-table indoor thermal conditions will increase the health and perceived comfort of these adults. To this end, a new set of thermal comfort metrics was designed and tested to address the thermal preferences of older adults. The SENIOR COMFORT Metrics 2013 outlined new thresholds for optimal indoor high and low temperatures and set limits on thermal variability over time based on the ASHRAE-55 2010 model. This study was conducted at Sunnyslope Manor, a multi-unit, public-housing complex in northern Phoenix. Nearly 60% (76 of 118) of the residents (aged 62-82) were interviewed using a 110-question, self-reporting survey in 73 apartment units. A total of 40 questions and 20 sub-questions addressing perceptions of comfort, pain, sleep patterns, injuries, and mood were extracted from this larger health condition survey to assess health and thermal comfort. Indoor environmental thermal measurements included temperature in three locations: kitchen, living area, and bedroom and data were recorded every 15 minutes over 5 full days and 448 points. Study results start to indicate that older adults for Sunnyslope Manor preferred temperatures between 76 and 82.5 degrees Fahrenheit and that lower temperatures as outlined by ASHRAE-55 2010 increases the rate of injuries and mood changes in older adults among other findings.

Thermal Comfort Assessment of Buildings

This book introduces the UTCI (Universal Thermal Climate Index) and summarises progress in this area. The UTCI (Universal Thermal Climate Index) was developed as part of the European COST Action Program and first announced to the scientific community in 2009. Since then a decade has followed of applicability tests and research results as well as knowledge gained from applying the UTCI in human adaptation and thermal perception. These findings are of interest to researchers in the interdisciplinary areas of biometeorology, climatology and urban planning. The book summarizes this progress, discussing the limitations found and provides pointers to future developments. It also discusses UTCI applications in the areas of human biometeorology and urban planning including possibilities of using UTCI and similar indices in climate-responsive urban planning. The book’s message is illustrated with many case studies from the real world. Chapter 10 is available open access under a Creative Commons Attribution 4.0 International License via link.springer.com.

Rethinking Sustainability Towards a Regenerative Economy

There is an urgent need to build human capacity to make the often vulnerable and exposed buildings and communities we live and work in more resilient to the changing social, economic and physical environments around us. Extensive research has been done over the last decades on both mitigation and adaptation to climate change in the built environment, but the outputs of much of this research have failed to result in the wider uptake of effective greenhouse gas emission reduction solutions. This volume introduces credible ‘fresh thinking’ on how this may be done. For the first time an emerging generation of research is brought together that is directly concerned with understanding, influencing and leading the transformation of markets and thinking in the built environment. Chapters cover: defining values setting targets consumer motivation selling existing ideas better developing new design principles, paradigms and programmes optimizing solutions to ensure that when change does happen, it does so in the
right direction. Papers are contributed by leading experts in fields ranging from philosophy, the social, political and physical sciences, engineering, architecture, mathematics and complexity science. The resulting volume will be essential reading for all those involved with changing the mindsets of a generation on the need to, and ways to, build resilience to rapid change and transforming markets in the built environment.

**Addressing the Climate in Modern Age’s Construction History**

This book comprises select proceedings of the First International Conference on Urban Science and Engineering. The focus of the conference was on the milieu of urban planning while applying technology which ensures better urban life, coupled with sensitivity to depleting natural resources and focus on sustainable development. The contents focus on sustainable infrastructure, mobility and planning, urban water and sanitation, green construction materials, optimization and innovation in structural design, and more. This book aims to provide up-to-date and authoritative knowledge from both industrial and academic worlds, sharing best practice in the field of urban science and engineering. This book is beneficial to students, researchers, and professionals working in the field of smart materials and sustainable development.

**The Development and Critical Evaluation of Learner Thermal Comfort Protocol for Applicability to Two Primary Schools in Mamelodi, City of Tshwane**

Providing a complete and in-depth overview of the available knowledge in the area of low energy and low carbon architecture. The scope of this edited book includes several important topics ranging from chapters giving a broad view of the progressing models in ecologically responsible environments to other chapters focussing on recent advances in de

**Indoor Thermal Comfort**

There are many aspects to consider when evaluating or improving an indoor environment; thermal comfort, energy saving, preservation of materials, hygiene and health are all key aspects which can be improved by passive methods of environmental control. Passive Methods as a Solution for Improving Indoor Environments endeavours to fill the lack of analysis in this area by using over ten years of research to illustrate the effects of methods such as thermal inertia and permeable coverings; for example, the use of permeable coverings is a well known passive method, but its effects and ways to improve indoor environments have been rarely analyzed. Passive Methods as a Solution for Improving Indoor Environments includes both software simulations and laboratory and field studies. Through these, the main parameters that characterize the behavior of internal coverings are defined. Furthermore, a new procedure is explained in depth which can be used to identify the real expected effects of permeable coverings such as energy conservation and local thermal comfort as well as their working periods in controlling indoor environments. This theoretical base is built on by considering future research work including patents and construction indications which will improve indoor environmental conditions with evidence from real data. This makes Passive Methods as a Solution for Improving Indoor Environments an ideal resource for specialists and researchers focusing on indoor air quality, thermal comfort, and energy saving or with a general interest in controlling indoor environments with passive methods.

**Clean Energy Opportunities in Tropical Countries**

A number of metrics for assessing human thermal response to climatic conditions have been proposed in scientific literature over the last decades. They aim at describing human thermal perception of the thermal environment to which an individual or a group of people is exposed. More recently, a new type of “discomfort index” has been proposed for describing, in a
synthetic way, long-term phenomena. Starting from a systematic review of a number of long-term global discomfort indices, they are then contrasted and compared on a reference case study in order to identify their similarities and differences and strengths and weaknesses. Based on this analysis, a new short-term local discomfort index is proposed for the American Adaptive comfort model. Finally, a new and reliable long-term general discomfort index is presented. It is delivered in three versions and each of them is suitable to be respectively coupled with the Fanger, the European Adaptive and the American Adaptive comfort models.

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