1. Record Nr. UNINA9910502644903321 Autore Azari Rahman Titolo Research methods in building science and technology / / Rahman Azari, Hazem Rashed-Ali Cham, Switzerland: ,: Springer International Publishing, , [2021] Pubbl/distr/stampa ©2021 **ISBN** 3-030-73692-X Descrizione fisica 1 online resource (187 pages) Disciplina 624.072 Soggetti Building - Research - Methodology Architecture - Research - Methodology Lingua di pubblicazione Inglese **Formato** Materiale a stampa Livello bibliografico Monografia Intro -- Introduction -- References -- Contents -- Research Methods Nota di contenuto for Assessing the Thermal and Optical Performance of Building

for Assessing the Thermal and Optical Performance of Building
Windows -- 1 History of and Rationale for Energy-Efficient Building
Windows -- 2 Experimental Methods for Building Windows -- 2.1 In
Situ Measurement Methods -- 2.1.1 Key Measurement Standards
for Window Properties -- 2.1.2 U-Factor Measurement -- 2.1.3 SHGC

Measurement -- 2.1.4 VT Measurement -- 2.2 Small-Scale Experiments Methodology for Thermal and Optical Window Performance -- 2.3 Large-Scale/ Full-Scale Experiments -- 3 Numerical Analysis Methods for Building Windows -- 3.1 Finite Element

Method -- 3.2 Governing Equations and Models in Numerical Analysis for Windows -- 3.3 Numerical Analysis for Indoor Environments by Side Windows -- 3.4 Numerical Analysis for Thermal Behaviors of Windows -- 4 Computational Design and Optimization Techniques for Building Windows -- 5 Human-Factor Experiments Evaluating Subjective Thermal and Visual Perception -- 6 Trends and Other Issues of Research Methods for Building Windows -- References -- Research Approaches for Building Enclosure Studies -- 1 An Array of Research Methods for Building Enclosure Studies -- 1.1 Laboratory Experiments -- 1.2 Simulation -- 1.3 Field Experiments -- 1.4 Field Study -- 2 Two Case Studies -- 2.1 Vegetated Roofing Study -- 2.2 Reflective Roofing

Research Study -- 3 Selecting an Appropriate Research Method

for a Building Enclosure Study -- 3.1 Vegetated Roofing Study -- 3.1.1 Laboratory Experiment -- 3.1.2 Simulation -- 3.1.3 Field Experiment -- 3.1.4 Field Study -- 3.2 Reflective Roofing Research Study -- 3.2.1 Laboratory Experiment -- 3.2.2 Simulation -- 3.2.3 Field Experiment -- 3.2.4 Field Study -- 4 Advice for Beginning Researchers --References -- Building Energy Performance Research - Current Approaches and Future Trends. 1 Introduction: Significance of Building Energy Performance -- 2 Review of Methodological Approaches -- 2.1 Simulation Research -- 2.2 Laboratory Experimental Research -- 2.3 Field Experimental Research -- 2.4 Field Studies Research -- 3 Important Areas of Energy Performance Research -- 3.1 Analysis of Building Typologies -- 3.2 Post Occupancy Evaluation -- 3.3 Impact of User Behavior on Energy Use -- 3.4 Integrated Building Scale and Urban Scale Energy Research -- 4 Research Tools and Equipment -- 4.1 Simulation Software -- 4.2 Field Equipment -- 5 Review of Selected Case Studies -- 5.1 Developing an Augmented Reality Prototype for Teaching Energy Efficiency Concepts -- 5.2 Under One Roof - Performance Assessment of High-Solar Reflectance Roof -- 5.3 Retrofit Potential of Historic Homes in San Antonio -- 6 Conclusions -- References -- Research Methods in Daylighting and Electric Lighting -- 1 Introduction -- 2 Determining and Evaluating the Quantity and Distribution of Light --2.1 Physical Measurement of Lighting Quantities -- 2.1.1 Photopic and Colorimetric Measurements -- 2.1.2 Circadian Light Measurements -- 2.1.3 Utilization of Measurements in Field and Laboratory Research -- 2.2 Computer Simulation of Lighting Quantities -- 2.2.1 Computational Simulation of Photopic and Colorimetric Quantities --2.2.2 Computational Simulation of Circadian Quantities -- 2.2.3 Utilization of Computer Simulation in Research -- 2.3 Combining Physical Measurements and Computational Simulations -- 2.4 Utilization of Measured and Computed Data -- 2.5 Optimization -- 2.6 Machine Learning -- 3 Determining Human Physiological Responses: Visual Comfort and Performance -- 3.1 Psychophysical Measurements -- 3.1.1 Subjective Measurements -- 3.1.2 Objective Measurements --3.2 Computational Visual Comfort Metrics -- 3.3 Modeling of Occupant Behavior. 4 Studying Human Experiential Responses -- 4.1 Perceptual Measures -- 4.2 Computational Perceptual Metrics -- 5 Conclusion -- References -- Research Methods in Computational Fluid Dynamics -- 1 Introduction -- 2 Applications of Computational Fluid Dynamics in the Built Environment -- 3 Computational Fluid Dynamics Software for Analyzing Building Performance -- 3.1 CFD Tool Within Whole Building Simulation Packages -- 3.2 Dedicated CFD Packages and Tools -- 3.3 Case Study Projects -- 3.4 Conclusion -- References --Advancements in Thermal Comfort Modeling Using Modern Sensing and Computational Technologies -- 1 Significance of Indoor Environmental Quality -- 2 Current Environmental Comfort Models and the Limitations -- 3 Skin Temperature-Driven Thermal Environmental Controls -- 4 The Practicality of Physiological-Signal Based Thermal Comfort Modeling -- 5 Advanced Computational Algorithms in Thermal Comfort Modeling -- 6 Individual vs. General Models -- 7 Additional Physiological Signals to Be Considered -- 8 Conclusion -- References -- Outdoor Thermal Comfort & Description -- References -- Outdoor -- Outdo Human Behavior Factors, Models, and Methodologies -- 1 Introduction -- 2 Factors in OTC Assessment -- 2.1 Environmental Factors -- 2.2 Physiological Factors -- 2.3 Psychological Factors -- 2.4 Behavioral Factors -- 3 OTC Evaluation Models -- 3.1 PMV/PPD -- 3.2 Adaptive Thermal Comfort Model -- 3.3 Klima-Michel Model (KMM) -- 3.4 SET*/

OUT-SET* -- 3.5 PET -- 3.6 UTCI -- 3.7 Discussion of OTC Evaluation Models -- 4 OTC Research Methodologies -- 4.1 Measurement-Based and Empirical Methods -- 4.2 Numerical and Simulation-Based Methods -- 5 Conclusion -- References -- Life Cycle Assessment as a Research Methodology for Estimating the Environmental Impacts of Buildings -- 1 Introduction -- 2 Why Do Research on the Environmental Impacts of Buildings? -- 3 Life Cycle Assessment Methodology.

4 Worked Example -- 5 Results of the Worked Example -- 6
Optimization and Data-Driven Approaches in Building LCA Research -7 Data Quality Issues and Disagreement of LCA Results -- 8 Standard
Reporting of LCA Processes and Results -- 9 Conclusion -- References
-- Index.