Elements Of Parametric Design

Elements Of Parametric Design Elements of parametric design Parametric design has revolutionized the way architects, designers, and engineers approach the creation of complex, adaptable, and innovative forms. Rooted in the use of algorithms and parameters, this methodology enables the generation of multiple design iterations through adjustable variables, fostering a dynamic and iterative development process. Understanding the core elements of parametric design is essential for harnessing its full potential, as these elements define the structure, flexibility, and functionality of the design process. In this article, we will explore the fundamental components that comprise parametric design, examining their roles, interactions, and significance in creating complex, efficient, and responsive forms. Core Elements of Parametric Design Parametric design is characterized by a set of interconnected elements that work together to produce flexible and responsive models. These elements include parameters, algorithms, relationships, constraints, and feedback mechanisms. Each element plays a specific role in shaping the design outcome and contributes to the overall adaptability of the process. Parameters Parameters are the foundational variables within a parametric model. They define the key aspects of the design that can be manipulated to generate different outcomes. Parameters can be numeric, categorical, or geometric, and serve as the input values that drive the algorithmic processes. Numeric Parameters: Values such as length, width, height, radius, or angles that can be adjusted within specified ranges. Categorical Parameters: Discrete options or categories, such as material types, surface finishes, or form styles. Geometric Parameters: Spatial attributes like points,

curves, surfaces, or volumes that define the shape and structure of the design. The flexibility of parameters allows designers to explore a vast array of configurations efficiently, enabling rapid prototyping and optimization. Algorithms Algorithms are sets of rules or procedures that process parameters to generate the design geometry or form. They translate the input variables into visual and spatial outputs, often 2 utilizing mathematical functions, logical operations, or computational routines. Procedural Rules: Step-by-step instructions that define how elements are created or modified based on parameters. Mathematical Functions: Formulas that relate parameters to geometric properties, such as sine or cosine functions for curves. Generative Processes: Algorithms that produce complex forms through iterative or recursive procedures, such as L-systems or fractals. Choosing appropriate algorithms is crucial for achieving desired design qualities, whether aesthetic, structural, or functional. Relationships and Dependencies Relationships establish how different parameters and elements interact within the model. They define dependencies that ensure consistency and coherence when changes occur. Parametric Links: Connections that automatically update related elements when a parameter is modified. Hierarchical Relationships: Parent-child relationships where changes in parent parameters cascade down to dependent elements. Conditional Dependencies: Logic-based relationships that activate or deactivate certain features based on specific conditions. Effective management of relationships ensures that the model remains robust and adaptable, allowing complex systems to behave predictably. Constraints Constraints are rules that limit the design parameters or relationships to maintain certain standards or functional requirements. They ensure that the generated forms are feasible, compliant, or optimized. Geometric Constraints: Rules such as perpendicularity, parallelism, or fixed distances between elements. Design Constraints: Requirements like maximum height, minimum clearances, or material limitations. Structural Constraints: Considerations related to load-bearing capacities, stability, or material properties.

Applying constraints helps prevent the creation of impractical or non-compliant designs, streamlining the design process. 3 Feedback Loops Feedback mechanisms allow the model to respond dynamically to changes, creating an iterative process that refines the design based on performance criteria or aesthetic goals. Performance Feedback: Incorporating structural analysis, energy modeling, or daylight simulations to inform design adjustments. Aesthetic Feedback: Using visual evaluations or user input to guide modifications. Automated Optimization: Employing algorithms that automatically adjust parameters to improve specific objectives, such as minimizing material usage or maximizing natural light. Feedback loops enable the creation of optimized, sustainable, and context-aware designs that evolve through continuous refinement. Additional Elements Influencing Parametric Design Beyond the core components, several other elements shape the effectiveness and scope of parametric modeling. These include data management, scripting languages, visualization tools, and user interfaces. Data Management Efficient handling of input and output data ensures that models are organized, scalable, and reproducible. Data Structures: Organized formats for storing parameters, relationships, and design iterations. Version Control: Tracking changes to facilitate experimentation and collaboration. Integration with External Data: Importing geographic, structural, or environmental data to inform design decisions. Scripting and Programming Languages Many parametric design tools rely on scripting to define complex behaviors and automate tasks. Common Languages: Python, Grasshopper (visual scripting), RhinoScript, or JavaScript. Custom Algorithms: Creating bespoke routines for specialized design challenges. Visualization and Simulation Tools Real-time visualization and simulation are vital for evaluating design performance. 4 3D Viewports: Interactive environments to manipulate and inspect models. Analytical Tools: Structural analysis, environmental simulations, or fabrication feasibility checks. Parametric Feedback: Visual cues that indicate how parameter changes influence the model. User Interface and Interaction A well-designed interface

simplifies parameter adjustments and enhances user experience. Slider Controls: For intuitive manipulation of numeric parameters. Dropdown Menus: To select categorical options. Custom Panels: Tailored interfaces that streamline complex workflows. Integrating Elements for Effective Parametric Design The true strength of parametric design lies in the seamless integration of its elements. A typical workflow involves defining parameters, establishing relationships, applying constraints, and selecting algorithms to generate initial models. Then, through iterative feedback, the model is refined, optimized, and validated against performance criteria. This cyclical process allows designers to explore a vast design space efficiently, uncover innovative solutions, and adapt to changing project requirements. Designers must also consider the interoperability of tools and data, ensuring that models can be easily exported, shared, and integrated with other software or analysis platforms. The selection of appropriate scripting languages, visualization tools, and user interfaces further enhances usability and productivity. Conclusion Understanding the elements of parametric design is fundamental for leveraging its full capabilities. Parameters, algorithms, relationships, constraints, and feedback mechanisms form the backbone of this dynamic methodology, enabling the creation of adaptable, optimized, and complex forms. As the field continues to evolve with advancements in computational power and software tools, mastery of these elements will remain essential for innovative and efficient design processes. Whether for architectural projects, product development, or urban planning, the thoughtful integration of these core components empowers designers to push the boundaries of conventional design and explore new realms of creativity and functionality. QuestionAnswer 5 What are the fundamental elements of parametric design? The fundamental elements include parameters (variables defining the design), relationships (rules linking parameters), and algorithms (computational procedures) that enable dynamic and adaptable design processes. How do parameters influence the elements of parametric design? Parameters act as adjustable inputs that

control the shape, size, and other attributes of a design, allowing for rapid modifications and exploration of multiple design options. What role do relationships play in parametric design? Relationships define the dependencies and constraints between parameters, ensuring design coherence and enabling automated updates when parameters change. Why are algorithms important in parametric design? Algorithms enable the procedural generation and manipulation of design elements based on defined parameters and relationships, facilitating complex and optimized forms. How does the concept of 'rules' integrate into parametric design elements? Rules set the constraints and conditions that govern how parameters interact, maintaining design consistency and guiding the development of valid solutions. Can you explain the importance of feedback loops in parametric design? Feedback loops allow the design system to iteratively refine and optimize the model by analyzing outputs and adjusting parameters accordingly, enhancing precision and creativity. What tools are commonly used to implement elements of parametric design? Tools like Grasshopper, Dynamo, Rhino, and Autodesk Revit are popular for creating and managing the parameters, relationships, and algorithms integral to parametric design workflows. Elements of Parametric Design: An In-Depth Exploration Parametric design has revolutionized the way architects, designers, and engineers approach the creation of complex structures and forms. At its core, it leverages algorithms, computational tools, and flexible parameters to generate adaptable and innovative designs. Understanding the fundamental elements that constitute parametric design is essential for harnessing its full potential. This comprehensive overview delves into each critical element, providing insights into their roles, functionalities, and interrelationships. --- Understanding the Foundation of Parametric Design Parametric design is rooted in the idea of defining relationships between design variables using parameters and rules. It allows for dynamic modifications, enabling designers to explore a vast array of options efficiently. To grasp its elements comprehensively, it's vital to understand the

building blocks that influence how parametric models are constructed and manipulated. --- Elements Of Parametric Design 6 Core Elements of Parametric Design The elements of parametric design can be broadly categorized into three groups: 1. Parameters 2. Rules and Constraints 3. Algorithms and Logic Each of these plays a pivotal role in shaping the final design output. --- 1. Parameters Parameters are the fundamental variables that define the characteristics of a parametric model. They serve as the inputs that can be adjusted to modify the design dynamically. - Types of Parameters: - Numeric Parameters: Quantitative values such as lengths, angles, radii, or heights. - Boolean Parameters: True/False conditions that activate or deactivate certain features. - Dropdown/Choice Parameters: Selection-based options allowing for categorical variations. - Text/String Parameters: Labels or identifiers used for naming or descriptive purposes. - Role of Parameters: - Facilitate design flexibility. - Enable quick variations and iterations. - Allow for optimization by tweaking input values. - Best Practices: - Keep parameters meaningful and intuitive. - Use descriptive naming conventions. - Limit the number of parameters to essential variables to maintain clarity. --- 2. Rules and Constraints Rules and Constraints govern how parameters interact and ensure the design maintains structural integrity, aesthetic coherence, or functional requirements. - Types of Rules/Constraints: - Geometric Constraints: Relationships such as parallelism, perpendicularity, or fixed distances. - Dimensional Constraints: Fixed or relative sizes that maintain proportions. - Logical Constraints: Conditional rules that enable or disable features based on specific parameter states. - Structural Constraints: Rules ensuring stability, load-bearing capacity, or compliance with codes. - Importance: - Ensure designs are feasible and functional. - Maintain consistency across variations. - Prevent invalid or undesirable configurations. - Implementation: - Use constraint-based modeling tools. - Embed rules directly within the parametric algorithm. - Regularly validate constraints during design iterations. --- 3. Algorithms and Logic Algorithms are the computational procedures that process parameters and

constraints to generate the design geometry. The logic defines the sequence and conditions under which these algorithms operate. - Types of Algorithms: - Procedural: Step-by-step instructions that build or modify geometry. - Mathematical: Equations and functions that calculate dimensions or positions. - Conditional: If-then statements that alter the flow based on parameter states. - Iterative: Loops that refine design elements through Elements Of Parametric Design 7 repeated calculations. - Role in Design: - Automate complex calculations. - Enable parametric variations to propagate through the model. - Support optimization processes such as generative design. - Design Considerations: - Keep algorithms efficient to reduce computation time. - Maintain clarity to facilitate updates and debugging. - Utilize modular logic for easier maintenance. --- Additional Elements That Enhance Parametric Design Beyond the core components, several supplementary elements play a significant role in refining and expanding parametric capabilities. --- 4. Data Inputs and External Data Integration Incorporating external data enhances the adaptability and contextual relevance of parametric models. - Sources of Data: - Geographic Information Systems (GIS) - Environmental sensors - Building performance data - User inputs or preferences - Benefits: - Context-aware designs. - Data-driven decision-making. - Increased accuracy and relevance. - Implementation Tips: - Use APIs or data connectors. - Ensure data compatibility with design software. - Validate data quality before integration. --- 5. User Interface and Interaction A well-designed user interface (UI) allows stakeholders to interact with parameters seamlessly. - Features of Effective UI: - Clear parameter controls (sliders, input boxes, dropdowns). - Real-time visual feedback. - Preset configurations for quick access. - Importance: - Facilitates collaborative design. - Empowers non-technical users. - Accelerates the iteration process. --- 6. Visualization and Feedback Mechanisms Visualization tools are essential for interpreting complex parametric data and understanding the implications of parameter adjustments. - Types of Visual Feedback: - 3D models and renderings. - Section views and plan diagrams. -

Color-coded parameter maps. - Best Practices: - Integrate live updates. - Use intuitive visual cues. - Provide comparative views for different parameter states. --- Interdependence and Hierarchies of Elements Understanding how these elements interact is crucial for effective parametric modeling. - Hierarchical Structure: - Parameters often feed into rules and algorithms. - Constraints may depend on specific parameters. - Algorithms generate geometry based on these inputs. - Feedback Loops: - Adjusting parameters triggers recalculations. - Visualization updates reflect changes instantly. - Iterative refinement becomes seamless. - Modularity: - Elements Of Parametric Design 8 Components can be reused or modified independently. - Modular design enhances scalability. --- Practical Application of Elements in Real-World Projects To anchor this theoretical understanding, consider how these elements manifest in actual projects. - Example 1: Facade Design - Parameters: Panel size, curvature radius, spacing. - Constraints: Panel alignment, structural support points. - Algorithms: Generate panel geometry based on curvature and spacing. - External Data: Sun position data to optimize shading. - UI: Sliders for panel size, toggle for pattern variations. - Visualization: Live rendering of facade with different configurations. - Example 2: Structural Framework - Parameters: Beam lengths, joint angles. - Constraints: Structural load paths, connection rules. - Algorithms: Structural analysis calculations integrated into design. - Data Inputs: Wind load data for environmental adaptation. - Feedback: Stress visualization on the framework. --- Future Trends and Evolving Elements Parametric design continues to evolve, introducing new elements and expanding existing ones. - Artificial Intelligence and Machine Learning: - Automate parameter optimization. - Discover innovative forms through generative algorithms. - Integration with Building Information Modeling (BIM): - Enable comprehensive data management. - Facilitate construction documentation and coordination. - Real-Time Simulation and Testing: - Incorporate physics-based simulations. - Test structural performance or environmental impact during design. --- Conclusion: Synthesizing the Elements for Innovative

Design Mastering the elements of parametric design–parameters, rules, algorithms, and their supporting components–is essential for unlocking its full potential. These elements work in tandem to create adaptable, efficient, and innovative designs that can respond to complex requirements and evolving project conditions. As technology advances, a deep understanding of these core components will empower designers to push boundaries and redefine possibilities in architecture, engineering, and beyond. --- Embracing the elements of parametric design is not merely about mastering tools but about cultivating a mindset of flexibility, exploration, and data-driven creativity. parameters, geometry, algorithms, computational design, scripting, programming, CAD, modeling, automation, flexibility

Parametric Design for ArchitectureElements of Parametric DesignStrategies for Parametric Design in ArchitectureCase Studies in Parametric DesignParametric Design ProceduresParametric Design in ArchitectureBeyond SpectacleImpact of Parametric Design on Young ArchitectsParametric Design for Landscape ArchitectsParametric Design in ArchitectureParametric Design ThinkingA Study of the Adaptation of Parametric Computer Design Among Landscape Architecture Professionals in TexasComputational DesignParametric DesignDesign Studies and Intelligence EngineeringArchitectonics and Parametric ThinkingFrom Large to SmallParametric Methods for BeginnersParametric Design Approach in Architecture Between Concept and Reality, Theory and Practice. The Impact on Its Users and the Existing SettingProceedings of the International Conference on Intelligent Vision and Computing (ICIVC 2021) Wassim Jabi Robert Francis Woodbury Roland Hudson Jeffrey Collins Hardi K. Abdullah Carlos R. Barrios Ding Xu Ayda Aglmand Azarian Andrew Madl Birkhauser Verlag GmbH Ata Chokhachian Chad Allen Paulson Rongrong Yu Cyrille Mbeumen Futcha Valentina Emilia Balas Frank Jacobus Sichen Sun Umut Toker Wissam Elmawi Harish Sharma

Parametric Design for Architecture Elements of Parametric Design Strategies for Parametric Design in Architecture Case Studies in Parametric Design Parametric Design Procedures Parametric Design in Architecture Beyond Spectacle Impact of Parametric Design on Young Architects Parametric Design for Landscape Architects Parametric Design in Architecture Parametric Design Thinking A Study of the Adaptation of Parametric Computer Design Among Landscape Architecture Professionals in Texas Computational Design Parametric Design Design Studies and Intelligence Engineering Architectonics and Parametric Thinking From Large to Small Parametric Methods for Beginners Parametric Design Approach in Architecture Between Concept and Reality, Theory and Practice. The Impact on Its Users and the Existing Setting Proceedings of the International Conference on Intelligent Vision and Computing (ICIVC 2021) *Wassim Jabi Robert Francis Woodbury Roland Hudson Jeffrey Collins Hardi K. Abdullah Carlos R. Barrios Ding Xu Ayda Aglmand Azarian Andrew Madl Birkhauser Verlag GmbH Ata Chokhachian Chad Allen Paulson Rongrong Yu Cyrille Mbeumen Futcha Valentina Emilia Balas Frank Jacobus Sichen Sun Umut Toker Wissam Elmawi Harish Sharma*

architects use cad to help them visualize their ideas parametric design is a fast growing development of cad that lets architects and designers specify the key parameters of their model and make changes interactively whenever changes are made the rest of the model updates automatically through a detailed description of various parametric generative and algorithmic techniques this book provides a practical guide to generating geometric and topological solutions for various situations including explicit step by step tutorials while the techniques and algorithms can be generalized to suit to any parametric environment the book illustrates its concepts using the scripting languages of one of the most powerful 3d visualization and animation design software systems autodesk 3ds max maxscript one of the most popular open source

java based scripting environments processing and a brand new language specifically tailored for parametric and generative design autodesk designscript this clear accessible book will have a wide appeal to students and practitioners who would like to experiment with parametric techniques

pushed by practices wanting to produce novelty computer aided design systems are increasingly parametric they represent designs that change with their input data such systems give more control and capability to designers but require much more comprehensive understanding to be used effectively this book teaches what new knowledge and skills designers need in order to master the parametric and how they can learn and use them

a new specialist design role is emerging in the construction industry the primary task related to this role is focused on the control development and sharing of geometric information with members of the design team in order to develop a design solution individuals engaged in this role can be described as a parametric designers parametric design involves the exploration of multiple solutions to architectural design problems using parametric models in the past these models have been defined by computer programs nowcommercially available parametric software provides a simpler means of creating these models it is anticipated that the emergence of parametric designers will spread and a deeper understanding of the role is required this thesis is aimed at establishing a detailed understanding of the tasks related to this new specialism and to develop a set of considerations that should be made when undertaking these tasks the position of the parametric designer in architectural practice presents new opportunities in the design process this thesis also aims to capture these developments in this field of design are driven by practice it is proposed that a generalised understanding of applied parametric design is primarily developed through the study of practical experience two bodies of work inform this

study first a detailed analytical review of published work that focuses on the application of parametric technology and originatesfrompractice this material concentrates on the documentation of case studies from a limited number of practices second a series of case studies involving the author as participant and observer in the context of contemporary practice this primary research of applied use of parametric tools is documented in detail and generalised findings are extracted analysis of the literature from practice and generalisations based on case studies is contrasted with a review of relevant design theory based on this a series of strategies for the parametric designer are identified and discussed

case studies in parametric design is a guide to scripting digital models for architects designers and builders the use of parametric design in architecture has afforded the realization of incredible built work modelling software can resolve complex geometry and aid in the development of stunning creations methods for creating the digital models to achieve these results however can be perplexing learning curves are steep and benefits garnered from adapting existing workflows to incorporate new tools may appear trivial this book describes programming techniques for a variety of buildings and provides novices an understanding of language and processes challenges intermediate users with rigor and intentionality and offers proficient practitioners objectives beyond novel form making the case studies consist of six mass topologies and six facade topologies each includes sample topology models and scripts descriptions of steps for generating customizable parametric models and suggestions for additional modelling inquiries this is essential reading for students and practitioners interested in harnessing the full potential of parametric design

this book introduces a new approach parametric design procedures pdps which combines the techniques of design procedures and parametric modeling to address the limitations of existing systems pdps use parameters e g initial shapes

variables operations numbers and relationships as inputs and calculate them through encapsulated mathematical processes to generate and explore solutions for the design problem being considered pdps provide a powerful and creative method to immediately compose a parameterized schema that can be used for design explorations this offers possibilities to explore a particular design instance after a model is constrained through the generation of an infinite number of design instances which can be considered in the evolution of parametric design instances the rational for and features of pdps are described the viability of this approach is explored through a prototype implementation in grasshopper the brief for an architectural design competition is used as the basis for the prototype development the implementation issues around pdps are discussed and the paper concludes with recommendations for further research

fundamentals methods and applications of parametric design for architects parametric design is a form of computer aided design in which geometrical elements such as architectural components are defined and interconnected by variable attributes known as parameters it counts as one of the most advanced methods in schools of architecture and is quickly becoming a standard in day to day architectural practice long the domain of mechanical engineering and automotive design then explored by international avant garde architecture parametric models can now be used as innovative tools for creative and efficient design work this book explains parametric design shows how it works and focuses on its functional advantages and practical applications the author carlos r barrios is an architect with a background in computer science and fine arts he has accompanied the development of parametric design at mit in cambridge and in cooperation with large practices such as som kpf and foster partners and has conveyed the principles and applications for many years in teaching systematically structured illustrated with international built examples and instructive drawings by the author this book

provides a thorough point of reference on a complex subject

in recent years with the help of rapid computational developments parametric design has become common in architectural practice parametric architecture due to its unique appearance has rapidly been associated with certain aesthetic trends this is mostly because architects initially adopted it to make radical forms not because parametric techniques demand any specific geometry for the chanel mobile art pavilion by zaha hadid architects the team built a dynamic and fluid structure using parametric techniques the form evolved from the spiraling shapes found in nature and the fluid geometry provides a continuum of space and a system of logic as a mobile pavilion it is made of a succession of reduced arched segments in order to provide easy transportation in addition to the spectacle to behold this demonstrates what else parametric design can achieve and how parametric architecture has the potential to change addressing this topic through an exhibition will give visitors a clear view of parametric architecture which consists of form making by simulating algorithms and morphogenesis then fabrication schemes then translating the intellectual and physical into the sensual by using the computer to simulate natural and morphogenetic forms then controlling the design and fabrication process of the pavilion exhibition through adjustment of the parameters visitors will witness parametric design in action the narrative space can be automatically generated and modeled by algorithms in addition to the form parametric design can produce a low technology fabrication scheme which is convenient for manufacturing accurate and efficient these features will be all presented in the pavilion abstract

the book contains general descriptions about features of museum design as well as a summary of project design process which was selected and rewrote from m a thesis of the students the book is consist of explanations about methods and

design elements of spaces such as museums cultural centers and projects with themes like digital museum children museum and garden art museum music museum theatre and structures like parasite pier and bridge meanwhile one of the salient features of the book is that it offers new ideas about facade design and samples based on iranian and islamic patterns for spaces like museums and exhibiting spaces taking benefit of design process and being bounded to it similar to other books is really important for me in this book too as it is seen in the projects conceptual sketches play important role in this process conceptual sketch stage is related to embodiment of ideas and thoughts formed in architectural imaginations however they are not sufficiently clear and the sketches help them to express themselves better conceptual sketches of these projects are not merely limited to manual design rather they are presented as 3d models in computer or volumetric works using 3d pens or prints at this stage there is a traverse between manual sketches and modeling the sketches are modeled with a new perspective or designed based on 3d models to enrich their volume or space this traverse which is regarded as a transversal movement during the design process is of special importance i call it interaction between design and computer this book is a software aided design practice trying to reach a better perception and recognition of iranian architecture and modern achievements of western architects in fact the book demonstrates the process of transition from manual to digital design in a country which was far from most software and technological progresses as well as essential trainings an endeavor to keep pace with global design pulse and its training

parametric design for landscape architects provides a sequence of tutorial based workflows for the creation and utilization of algorithmic tools calibrated toward the field of landscape architecture contemporary practice and projective theory in landscape architecture require the processing and design of data associated with complex systems to

adequately represent composite emergent scenarios aligning to both traditional and nascent processes of analysis and digital modeling this book unpacks and decodes the characterization of algorithmic based automation leveraging software that is widely accessible in both academia and professional practice curated throughout are workflows that apply to a multiplex of computation programs that widely support the design analysis and production of landscapes primarily concentrated on digital modeling tools grasshopper and rhinoceros it is a much needed visually accessible resource to aid in more efficient understanding and creation of tools that automate and re examine traditional calculations analyses drawing standards form finding strategies fabrication preparations and speculative assessments simulation this primer provides professionals and students with multifaceted skill sets that when applied in practice expand and expedite conventional and speculative design workflows applicable to spatial design and more specifically landscape architecture the book includes over 200 full colour drawings images and tables to illustrate and support examples throughout

this book explains parametric design shows how it works and focuses on its functional advantages and practical applications the author carlos r barrios is an architect with a background in computer science and fine arts he has accompanied the development of parametric design at mit in cambridge and in cooperation with large practices such as som kpf and foster partners and has conveyed the principles and applications for many years in teaching systematically structured illustrated with international built examples and instructive drawings by the author this book provides a thorough point of reference on a complex subject

parametric design utilizes algorithmic based software to produce computational generative responsive and immersive three dimensional models for use in landscape architecture planning and architecture cantrell holzman 2016 jabi 2013

advanced parametric software tools such as rhinoceros and grasshopper combine to create a robust system to express a set of customizable parameters that define and clarify the design intent and set of iterative solutions to a design problem jabi 2013 although parametric design in architecture has been in use for over 15 years it has not been broadly adopted by the field of landscape architecture current professional practices illustrate that software development within the design fields including landscape architecture are strongly trending towards augmented reality open source software and building information modeling systems bentley et al 2016 the purpose of this research is to understand the adaptation and implementation of the innovation of parametric design into the field of landscape architecture overall then specifically to the practice and the speed with which the innovations are being adapted into landscape architecture firms in texas research on this topic has the possibility to increase awareness of technological advancements in the practice and education of landscape architecture architecture and planning in this study the researcher documents the current understanding of parametric design in the practice of landscape architecture nationally and internationally through literature review and then compares it to the practice in texas by studying landscape architecture professionals perceptions on the issue this research followed qualitative methods deming swaffield 2011 to acquire the knowledge needed to understand the adaptation and implementation of the innovation of parametric design in texas in this study this researcher conducted in depth interviews to discover patterns in the acceptance or likely adaptation of parametric design in landscape architecture firms the subjects were designers or managers of landscape architect firms that practice landscape architecture in texas the snowball technique was used to acquire the study population taylor bogdan 1998 rogers theory diffusion of innovation was used to design questions to be used while interviewing landscape architectural professionals to determine their level of adapting innovation rogers 1995 deming swaffield 2011 to their design practices

themes were drawn from the interviews using the diffusion of innovation categories to document the overall rate of adaptation to the process of parametric design experienced from the participants in the interviews the responses are studied qualitatively to understand where each firm or landscape professional stands within its process of innovation taylor bogdan 1998 deming swaffield 2011 in conclusion this research assessed that adaptation is happening in landscape architecture firms in texas and summarizes its current usage and explores the technical financial and educational issues of adapting to these methods the interviewees had a wide range of experience in professional management and practice however experience with emerging industry software and technology was more prevalent in the training of new staff then it is with upper management most firms agreed that technology changes are on the horizon but there is no clear way of defining what that means for each practice using parametric design

new computational design tools have evolved rapidly and been increasingly applied in the field of design in recent years complimenting and even replacing the traditional design media and approaches design as both the process and product are changing due to the emergence and adoption of these new technologies understanding and assessing the impact of these new computational design environments on design and designers is important for advancing design in the contemporary context do these new computational environments support or hinder design creativity how do those tools facilitate designers thinking such knowledge is also important for the future development of design technologies research shows that design is never a mysterious non understandable process for example one general view is that design process shares a common analysis synthesis evaluation model during which designers interact between design problem and solution spaces understanding designers thinking in different environments is the key to design research education and

practice this book focuses on emerging computational design environments whose impact on design and designers have not been comprehensively and systematically studied it comprises three parts the history and recent developments of computational design technologies are introduced in part i the main categories of technologies cover from computer aided drafting and modelling tools to visual programming and scripting tools for algorithmic design to advanced interfaces and platforms for interactions between designers between designers and computers and between the virtual environment and the physical reality to critically explore design thinking especially in these new computational design environments formal approaches to studying design thinking and design cognition are introduced and compared in part ii drawing on literature and studies from the 70s to the current era part iii concludes the book by exploring the impact of different computational design technologies on design and designers using a series of case studies conducted by the author team building on their close collaboration over the past five years the book offers new insights into designers thinking in the rapidly evolving computational design environments which have not been critically and systematically studied and reported in the current literature the book is meant for design researchers educators and students professional practitioners and consultants as well as people who are interested in computational design in general

the discipline of design studies applies various technologies from basic theory to application systems while intelligence engineering encompasses computer aided industrial design human factor design and greenhouse design and plays a major part within design science intelligence engineering technologies also include topics from theory and application such as computational technologies sensing technologies and video detection this book presents the proceedings of dsie2023 the 2023 international symposium on design studies and intelligence engineering held on 28 29 october 2023 in hangzhou china

the conference provides a platform for professionals and researchers from industry and academia to present and discuss recent advances in the fields of design studies and intelligence engineering it also fosters cooperation among the organizations and researchers involved in these overlapping fields and invites internationally renowned professors to further explore these topics in some depth providing the opportunity for them to discuss the technical presentations with conference participants in all 275 submissions were received for the conference 105 of which were accepted after thorough review by 3 or 4 referees for presentation at the conference and inclusion here providing a valuable overview of the latest developments the book will be of interest to all those working in the fields of design studies and intelligence engineering

this book is an approachable guide for students and professionals to learn parametric modeling through the lens of architectonics allowing readers to pair fundamental ideas about architecture with parametric thinking architectonics and parametric thinking begins by clearly positioning the potentials of parametric design through a series of chapters written by leaders in their respective industries this helps to situate the vast potential of parametric softwares allowing the reader to understand the full range of what is made possible by working computationally following this theoretical introduction the book presents a manual that walks readers through the step by step construction of parametric modeling scripts built through an architectonic lens using clear compelling diagrams each of these diagrams provide textual accompaniment that describes how each new portion of the script is transforming the algorithm as a whole as well as diagrams that show the physical transformation that is taking place as a result of the script s evolution parametric modeling is radically transforming the design disciplines and will become the primary way designer s generate new products moving forward

written and expertly designed for architecture students and professionals this book provides an interactive approach to teaching the basics of parametric thinking in relation to architecture and design

in this thesis the author analyzes her affection to architecture forms and connects it with design methods and then applies them to human scale design

this book introduces architectural applications of parametric methods in design drawing direct connections between each phase of the architectural design process with relevant parametric approaches readers will find applications of parametric methods with straightforward explanations of concepts commands as well as applicable examples for each phase of the architectural design process in addition to learning about the historical and conceptual background of parametric design readers can use this book as a go to source during their day to day design practice chapters are organized according to different phases of the architectural design process such as site analysis spatial organization skin systems and environmental performance analyses together they deliver concepts applications and examples utilizing in depth visual guides that explain commands their outcomes and their interrelationships with over 350 images this book includes examples from the author s own design studio and parametric design teaching in elective classes based on the rhinoceros and grasshopper platforms this book is an accessible yet in depth resource for architecture students and early professionals who are considering integrating parametric applications into their design processes

master s thesis from the year 2022 in the subject art architecture history of construction grade 1 8 anhalt university of applied sciences bauhaus dessau course design research language english abstract this research investigates the

evaluation of parametric based architecture in relation to its users and the surrounding environment the phaeno science centre in germany serves as a case study raising questions about how well the building fits with its local setting and users the study adopts a qualitative and quantitative methodology known as post occupancy evaluation which seeks feedback from building users and architects the research emphasizes the need to distinguish between the behavior of complex systems and their users and the existing setting it stresses that evaluating parametric architecture requires an understanding of the whole context rather than just a single structure the study also suggests that architects should focus on the connectivity between built structures and users rather than ignoring it in addition the study highlights the importance of evaluating architecture in general and parametric architecture in particular given its widespread use in our built environment it advocates for the inclusion of the post construction evaluation phase in the conventional core phases of the architectural design process making it just as important as other stages the methodology for this study involves gathering data from numerous sources including users locals architects professionals journals newspapers libraries interviews surveys site visits and personal reflections by incorporating multiple viewpoints the study hopes to gain a comprehensive understanding of the perceptions surrounding parametric architecture overall the study emphasizes the importance of evaluating parametric based architecture in relation to its users and the existing environment it stresses the need for architects to focus on the functiona

this book gathers outstanding research papers presented at the international conference on intelligent vision and computing icivc 2021 held online during october 03 04 2021 icivc 2021 is organised by sur university oman the book presents novel contributions in intelligent vision and computing and serves as reference material for beginners and advanced

research the topics covered are intelligent systems intelligent data analytics and computing intelligent vision and applications collective intelligence soft computing optimization cloud computing machine learning intelligent software robotics data science data security big data analytics and signal natural language processing

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