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Dissertation Abstract

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Creativity is a vital issue in design studies, a great number of literatures approach to design creativity from the perspectives of cognitive and social. Additionally, many creative methods and tools for design thinking are considered and built. These methods and tools for enhancing design creativity are related with two kinds of aspects, one is the process of design and the other is the outcome of design. However, their methods for creative architecture design were mainly belong to reductionist thinking, the complex nature of architecture in the 21st century is ignored.

In this dissertation, we first review the simplicity and complexity of architecture. On this background, we acknowledge architecture as a complex adaptive system (CAS) and present a new design thinking approach 'Concept Topology Optimization' (CTO) for creative architecture design. Then we conducted three case studies by utilizing 'Concept Topology Optimization' to explore new methods in architecture location design, architecture space design and architecture construction safety design.

As case studies, three proactive methods are presented. The first case discusses a Soil & Water Assessment Tool （SWAT） model-based expo architectural location design, the second case explores a new method for architecture space design based on Substance-field and the third case focus on design of building construction safety prediction model based on optimized BP neural network algorithm. The results of these case studies indicate that 'Concept Topology Optimization' is an effective design thinking approach in architecture design as a complex adaptive system.

After that, we further discuss the changes of knowledge creation by combining 'Concept Topology Optimization', 'creativity' concerns the process of creating and applying new 'knowledge', intrinsically, 'creativity' is at the very heart of 'knowledge creation'. However, our 'creativity' is 'blocked' in a variety of ways, including deep-seated beliefs about the acquired knowledge. Hence, we argue to accept unpredictability, respect (and utilize) autonomy and creativity, and respond flexibly to emerging knowledge and opportunities.