Abstract

Reem Mo Salah ElDin Mahmoud ElSamadisy

Biomimicry as a Design Approach for Adaptation

International research suggests that the built environment may be responsible for at least a third of global greenhouse gas (GHG) emissions and that they are not responsive to different environmental aspects. Built environment needs to adapt to different environmental context to keep people comfortable and safe. Building envelopes represent the interface between the outdoor environment and the indoor occupied spaces. They are often considered as barriers and shields, limiting solutions that adapt to environmental changes. Nature provides a large database of adaptation strategies that can be implemented in design in general, and in the design of building envelopes in particular. Biomimicry, where solutions are obtained by emulating strategies from nature, is a rapidly growing design discipline in engineering, and an emerging field in architecture. This research presents biomimicry as a design approach to facilitate the generation of design concepts and enhance the development of building envelopes that are better suited to their environments. The aim of this research is transforming adaptation mechanisms and strategies in nature to design concepts for building envelope adaptation to different environmental contexts and to introduce environmental adaptation strategies and mechanisms from nature to provide a proper representation of the biophysical information to be accessible by architects. This would be done by studying building envelope’s comfort demands and challenges, and nature’s survival strategies & mechanisms in different environmental context then applying biomimetic innovations by examining the success of some strategies by converting them do a conceptual building skin and testing its result to be a source of innovation, in creation of more resilient adaptive architecture. In this work, the functional role of morphology and behaviour of building envelopes for environmental adaptation is emphasized. This would promote the development of adaptive solutions for building envelopes.