

Topological interlocking in architecture: A new design method and computational tool for designing building floors

Abstract

This paper presents a framework for the design process of structural systems based on the notion of topological interlocking. A new design method and a computational tool for generating valid architectural topological interlocking geometries are discussed. In the heart of the method are an algorithm for automatically generating valid 2D patterns, and a set of procedures for creating several types of volumetric blocks based on the 2D patterns. Additionally, the computational tool can convert custom sets of closed planar curves into structural elements based on the topological interlocking principle. The method is examined in a case study of a building floor. The paper concludes with discussions on the potential advantages of using the method for architectural design, as well as on challenging aspects of further development of this method towards implementation in practice.