CONCEPTUAL DESIGN AND CONSTRUCTIBILITY OF NON-STANDARD MORPHOLOGIES: PASCALIAN FORMS AS GENERATIVE TOOL

These last decades differ by the emergence of new architectural forms characterized by an absence of orthogonality. Digital tools drive architects to projects with complex forms referred as "non-standard". Nevertheless, their constructibility results in numerous issues. This study aims at focusing on the shape, from its initial generation to its construction, in order to improve a better interoperability between partners of the design process (architects, engineers and technicians). The first part identifies this tendency in the current context and proposes a classification of forms relying on a structural morphology analysis. Then, peculiarities for which the shape is excluded from the other design parameters are revealed as well as the limitations of the engineering tools. The second part presents a generative tool based on pascalian forms or pForms. This geometrical approach relies on simple rules which allow to understand and grasp the generative process of complex shapes. Following this theoretical development, we work on operational potentialities. The third part proposes a set of tools based on the exploitation of the geometrical properties to elaborate solutions on mechanical and technical levels. The fourth part extends these objectives by using the potential of immersed forms. The relevance and the efficiency of the propositions are discussed on case-studies. Finally, exploratory developments present fruitful structural, mechanical and technological alternatives in perspectives of applications.

KEY-WORDS

Non-standard architecture, structural morphology, design process, generative tool, parametric forms, pascalian forms, pForms.

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