The conception of parameters and constraint-based models in architectural projects: The case of Lelé's pivot domes

Fernando Ferraz Ribeiro[a], Davidson Martins Moreira[a], Arivaldo Leão de Amorim[b]

[a]*Programa de Modelagem Computacional, SENAI Cimatec, Av. Orlando Gomes 1845, 41.650-010 Salvador, Bahia, Brazil*

[b]*Laboratório de Computação Gráfica Aplicada à Arquitetura e ao Desenho LCAD, Faculdade de Arquitetura, Universidade Federal da Bahia (UFBA), Salvador, BA, Brasil*

Abstract

Following increasing interest among architects in the application of generative algorithms in the conception of projects, many questions have been raised concerning teaching this particular manner of thinking about forms. One of the main goals of learning the subject is to understand how the idea of the construction of an element can be translated into the rules of an algorithm. Other aims are to introduce the requisite programming-related concepts to implement the algorithms, and to locate this method within the scope of disciplines involved in the construction activity. This paper proposes an example-based strategy to discuss these three crucial issues by using the pivot domes designed by Brazilian architect Lelé as the object of study.

Keywords: Parametric Models, Geometric Constraints, Generative Algorithms.

1. Introduction

The concepts, techniques, and applications of generative algorithms have offered significant gains in the last few decades, and have thus garnered considerable interest from architects, researchers, and teachers [1]. Many leading global *bureaus* in the field of architecture have invested in implementing and maintaining programming departments to collaborate in the creative process of building design [2]. The range of influence of computer-aided design (CAD) extrapolates the aspect of an applied tool and reaches aesthetic theories [3] [4] and, through integration with computer-aided manufacturing (CAM) systems, construction activities [5]. Generative algorithms have contributed to this process.

In the academic world, the assimilation of the methods, tools, and knowledge involved in the understanding of generative design paradigms presents a range of possibilities and opportunities to rethink relations among disciplines involved in the design activities [5] [6].

Email addresses: ffribeiro@gmail.com (Fernando Ferraz Ribeiro), davidson.moreira@gmail.com (Davidson Martins Moreira), alamorim@ufba.br (Arivaldo Leão de Amorim)