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The Fractal Pattern of the French Gothic Cathedrals

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Abstract The classic patterns of Euclidean Geometry were used in the construction of the Gothic cathedrals to provide them with proportion and beauty. Still, there is also another complex concept related to them: the un-evenness of their structures, which determines their space-filling ability, that is, their level of roughness. In this paper we use the techniques of Fractal Geometry to generate parameters which provide a measure of roughness. In this way we show that the French Gothic cathedrals do not only follow Euclidean geometric patterns, but also have a general non-random fractal pattern.

Keywords French Gothic · Fractal parameter · Fractal dimension · Gothic architecture

Introduction

Benoit Mandelbrot was the main developer of Fractal Geometry in the late 1970s. His theories have evolved and have been used in several fields including architecture. Inspired by Mandelbrot's work, Bechhoefer and Bovill used the concept of fractal dimension in architectural drawings (Bechhoefer and Bovill 1994; Bovill 1996). As a result of this work, many authors (see Ostwald et al. 2008; Vaughan and Ostwald 2009, 2010, 2011; Ostwald and Vaughan 2009, 2010) used similar techniques to analyze the design of certain architects such as Le Corbusier,

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