

## Fractal geometry and its reflection on pavilion design in the environmental surrounding

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### Abstract:

Fractal geometry has gained significant attention due to its attractive repetitions and endless complexities. Fractal geometry offers a unique approach in architecture, interior and exterior design, and furniture design in particular. The beauty of fractal geometry appeared in outdoor spaces through the design of pavilions, whether temporary or semi-permanent structures, this is due to a general problem in that contemporary pavilions lack compatibility with their environmental surroundings and rely on traditional designs. From here, the study assumed that using the principles of fractal geometry in pavilions design would contribute to achieving better harmony with the environmental surroundings. From here, analytical studies have shown a set of results that confirm this hypothesis, the most prominent of which is that the use of fractal geometry in pavilion designs creates new dimensions for the observer's perception of the surrounding environment. Additionally, the use of fractal shapes in pavilion designs in public places results in visually rich designs that enhance the aesthetic appearance of the environmental surroundings.

Statement of the Problem: Contemporary pavilions often lack compatibility with their environmental surroundings and are based on traditionalism.

**Research Objectives:** Integrating environmental, cultural, and historical elements into the pavilion designs to fit with the environmental surroundings.

Reliance on fractal design methods to enhance the aesthetic values of contemporary pavilions within their environmental context.

**Research hypotheses:** - The research assumes that highlighting the principles of fractal geometry in pavilion designs will contribute to achieving better harmony with the environmental surroundings, which increases the effectiveness of designs in providing shade and beauty. - Adopting a design vision that aligns with the environmental, cultural, and historical context of each site helps to enhance the environmental sustainability of pavilions and reduce their negative impact on the surrounding environment.

**Research Methodology:** A theoretical study of the concept, properties, characteristics and methods of generating fractal geometry. An analytical study of pavilion designs in their environmental surroundings. Extracting the most important results to align pavilion designs with their environmental surroundings.

**Research Results:** One of the most important applications of using fractal geometry in design is creating a virtual environment through shadow and light. Fractal geometry in design creates new dimensions for human perception of the surrounding environment. Using the fractal geometry method in the service elements adjacent to archaeological areas is a rich experience that enhances the aesthetics of the monument, as the design is based on contrast rather than harmony. This is one of the most important rules of UNESCO in preserving the sanctity of the monument. Fractal patterns in pavilions create a balance between mass and space through shade and light, producing complex shadows whose angles change with the sun's rotation. This constant change creates a dynamic and aesthetic effect that enhances the visitor experience and gives the place vitality throughout the day. The integration of fractal pavilions with archaeological sites provides a rich visual and cultural experience, enhancing the value of the tourist site. The use of fractal shapes has been shown to enhance the geometric aesthetics of pavilions, adding a unique character to the design. The use of fractal shapes in the design of pavilions in public places creates visually rich designs that enhance the aesthetic appearance of the surrounding environment.

### Keywords :

Fractal geometry, Pavilions, Environmental surroundings.

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