The Concept of Fluidity and its Role on Formulating the Scenic Design

Dr. Randa Ismail Taha Abdel Mageed Negm
Associate Prof., Department of Decoration, Faculty of Fine Arts, Alexandria University, Egypt,
randa.taha@pua.edu.eg

Abstract:

Nature in the universe is full of creative shapes, and irregular complex design formations such as clouds, seas, dunes, etc., the designers admired these curved formations and began to simulate their complex structures, but they faced a problem in the difficulty of implementing with traditional techniques in design. With the development in the digital revolution, mathematics, biology, and computer software in the twenty-first century has given rise to many complex designs and architectural trends. Designers benefited from it and enabled them to create complex designs with flowing shapes inspired by nature that cannot be designed using traditional techniques, and modern trends in design depend on the concept of form-finding and not making the form as it was in the past. The research deals with the concept of fluidity as one of the recent trends in digital design and clarifies the concept of fluidity and its characteristics and the possibility of creating innovative design changes in the design process. The first person to invent the term fluidity was the architect Frank Lloyd Wright in 1990 AD, and he made it the primary language of his architectural projects, after which many designers began to apply the concept of fluidity in their architectural projects such as architect. Zaha Hadid is an architect whose work is characterized by fluidity and free dynamism. Zaha Hadid's work embraces comprehensive and variable architectural aesthetics that depend on distortion, shaping, extension, compression, and movement of shapes. Many furniture designers have also taken inspiration from the concept of fluidity in designing various furniture units such as Zaha Hadid and. Emmanuel Babel, Igor Solovyov, Dan Mulder, and others. The researcher applied the concept of fluidity and was inspired by it experimentally in designing several different theatrical scenes. The researcher concluded that it is possible to take advantage of the capabilities and formal aesthetics of the concept of fluidity to enrich the creative process of design and create high complexity and dynamic designs suitable for various theatrical performances that could not be designed with traditional capabilities. At the end of the research, the researcher reached conclusions and recommendations.

Keywords:
Scenic Design, Creativity, Architectural Form, Fluidity

Paper received 15th February 2020, Accepted 25th March 2021, Published 1st of May 2021

Introduction:

Nature is a designer's first teacher and the primary source from which he draws ideas to create unique designs. As Herbert Read said (17), God Almighty has made nature the main source of inspiration for man, Nature in the universe is full of creative shapes and complex irregular design formations such as clouds, seas, and dunes, etc., designers were influenced by those formations with curves and began to simulate its complex structures, but they faced a problem in the difficulty of implementing with traditional techniques in design With the development of computer programs, designers have become able to design and create complex curve structures and implement them easily with the advancement of computer science, complex algorithms, which brought about the tremendous developments in architecture and building technology (5). Figure (1-4).

Definition of the term" fluidity":

several definitions have emerged for the term "fluidity" which, by combining them, can be made a definition for the term "fluidity". The word "liquidity or fluid in chemistry" is a case between a solid and a gas.

The concept of fluidity in the Cambridge dictionary is the state of matter in which the structure changes constantly and spontaneously(8), it is a state of uncertainty and flow (9). The liquid state differs from the solid-state of the substance in that as a result of the close interconnection between its molecules, the material in its solid-state has a fixed form. The relations between its molecules vary concerning the liquid state of the material. The shape is continuously changing, and they are amorphous substances that are easily influenced by external pressure and are shaped by the vessels they hold (10).

Fig.(1) Mountains are fluid form Hagar Moharam(2018) Matterhorn Summit Brilliant, Retrieved from almrsal.com on25/9/2018

Fig(2) Sea waves are smooth in shape and fluid form Amira atef(2020) Sea images 2020 beautiful sea backgrounds 1441retrived frommuhtwa.com on 29/10/2019

Fig.(3) sand dunes are fluid form. WAM(2019) Sand dunes in poetry",Retrieved from albayan.ae on16 /1/2019

Fig(4) clouds are fluid form FatenIssa(2019)Definition of cumulus clouds Retrieved from sotor.comOn 25 /8/2019

Methodology:

• Descriptive and Analytical Approach: through the study of the fluid concept, its basic characteristics in architecture.

•Experimental method:

It deals with the innovative aspect of designing complex theatrical scenes inspired by the fluid architecture

Research problem:

This study attempts to answer the following questions:

• Can we benefit from employing the new digital concept, " fluidity ", in designing theatrical scenography?

• What can the new "fluidity" concept provide for visual insights in scenic design?

Objectives:

Study the aesthetic and visual values of the concept of fluidity, and the need to clarify the possibility of using the concept of fluidity and to benefit from it in designing visual compositions that can be used in the formation of innovative theatrical scenes.

Hypothesis:

• The researcher assumes that the concept of fluidity can be used to design different theatrical scenes that suit different theatrical performances such as fictional and festive shows, fashion shows and others.

Significance:

Presenting a new aesthetic vision of design inspired by the concept of liquidity.

• Achieving innovative visual designs and visions in the field of scene design.

• Opening new horizons for experimentation by seeking to find new creative solutions in the design of the theater scene, inspired by the concept of fluidity.

Theoretical Framework:

Fluid Architecture:

Architect Frank Gehry says: "Fluid architecture is like jazz, in which you can improvise and create something new." The flowing architectural thinking of architectural design is called "liquid architecture" as well as "liquid fractals" (11). The name was primarily inspired by the fluid shapes of living things, such as snakes and fish, in the softness of their composition and the multiple, indeterminate curves. Architect Frank Gehry was the first person to use the word "fluid fractals" in the 1990s. He made it the primary language for his architectural projects, as in his design for a Fish Dance restaurant in Japan, Concert Hall in Los Angeles, USA, Jerry also designed the

Guggenheim Museum in Spain and based his design on smooth, balanced curves (1) shapes (3-4).

Architect Pinar DinçKalayci developed a definition for the term liquidity, which means that a building appears to be in a state of flow or flow of people within a building that looks like a fluid(2).

As for the American "nana last" architect, she described the term flow or fluidity in architecture as the dynamic energy or force that binds small particles.

It is called the "boson" after the "theory of bosons" launched by the European Organization for Nuclear Energy (CERN) in July 2012, which describes tiny particles smaller than the atom and called elementary particles called bosons, and they are the elementary particles or forces that bind small particles together and spread out in The void in the form of rotating fields (10). Among the most famous architects who applied the streamlined direction in their designs, the most important of which is the designer Zaha Hadid, whose works are characterized by fluidity and free dynamism, and Zaha Hadid's work relies on comprehensive and variable architectural aesthetics that depend on the distortion, formation, extension, pressure, and movement of shapes.

The development of building materials has introduced new capabilities that give designers the ability to give their designs a sense of materiality and lightness, such as fine cement tubes and titanium dioxide. And other materials with high specifications in durability and durability. Zaha Hadid says: "Streamlined designs are inspired by the dynamism of hand graphics, and rely on simulating organic shapes or generating shapes using specialized computer systems.

Among her most famous streamlined designs is the Guggenheim Museum in Taiwan (13), as well as the Heydar Aliyev Center (Baku, 2013) in Azerbaijan. The flexible building has smooth surfaces in flowing dynamics, and Zaha also designed a Nordpark railway station (Innsbruck, 2007) inspired by flowing rivers. And ice formations and other streamlined buildings (16), (23) Fig (7-12).

Figure (5) Walt Disney Hall in Los Angeles, America

Discover Los Angeles (2019) Walt Disney Concert Hall: A Los Angeles Cultural Icon retrieved discoverlosangeles.com on20/1/2021

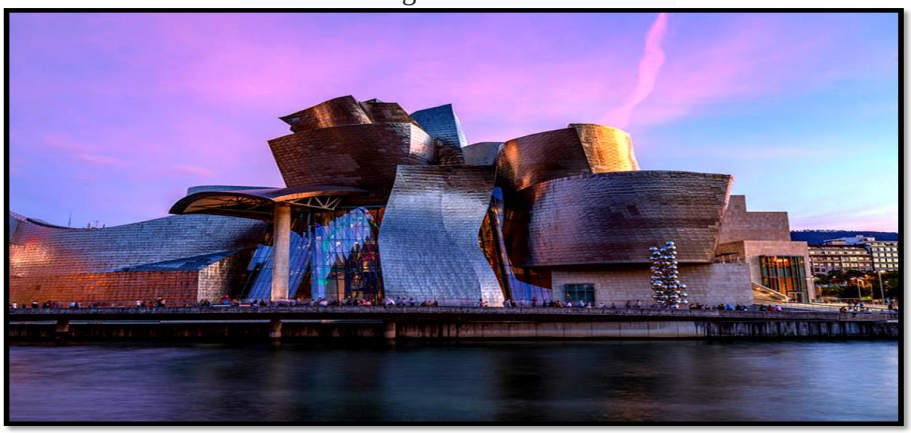


Figure (6) Guggenheim Museum in Spain

Joana Kruse (2020)Guggenheim Museum - Bilbao, SpainGuggenheim Museum, Bilbao, Basque Country, Spain, Europe retrieved fineartamerica.com on 18/1/2021

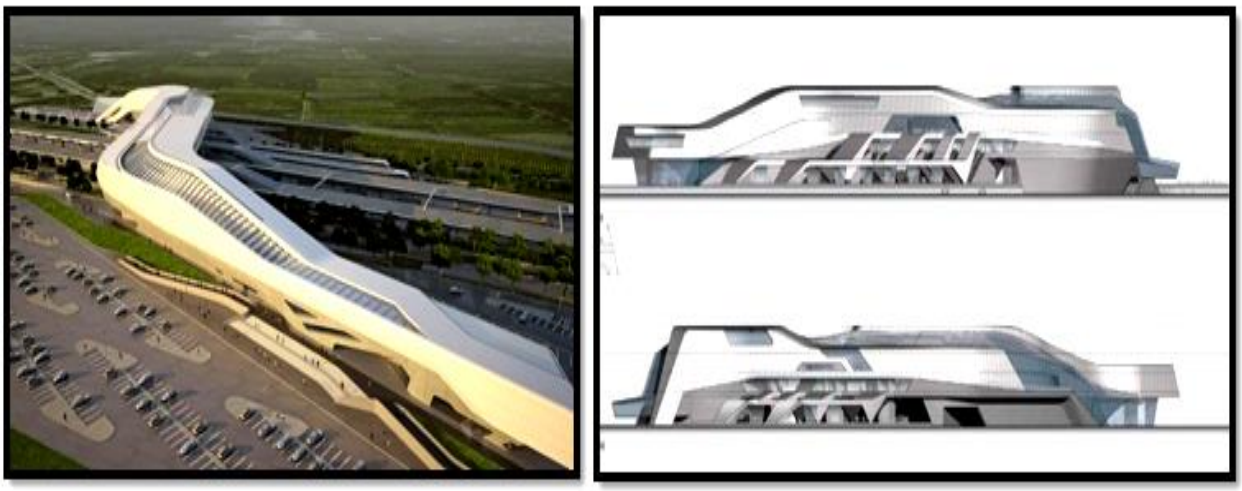


Figure (7)right and left, Fastest train station in Italy, designed by ZahaHadid
Archity pereview(2012)High Speed Train Station Napoli-Afragola
Retrieved fromarchitypereview.com on 20/1/2021

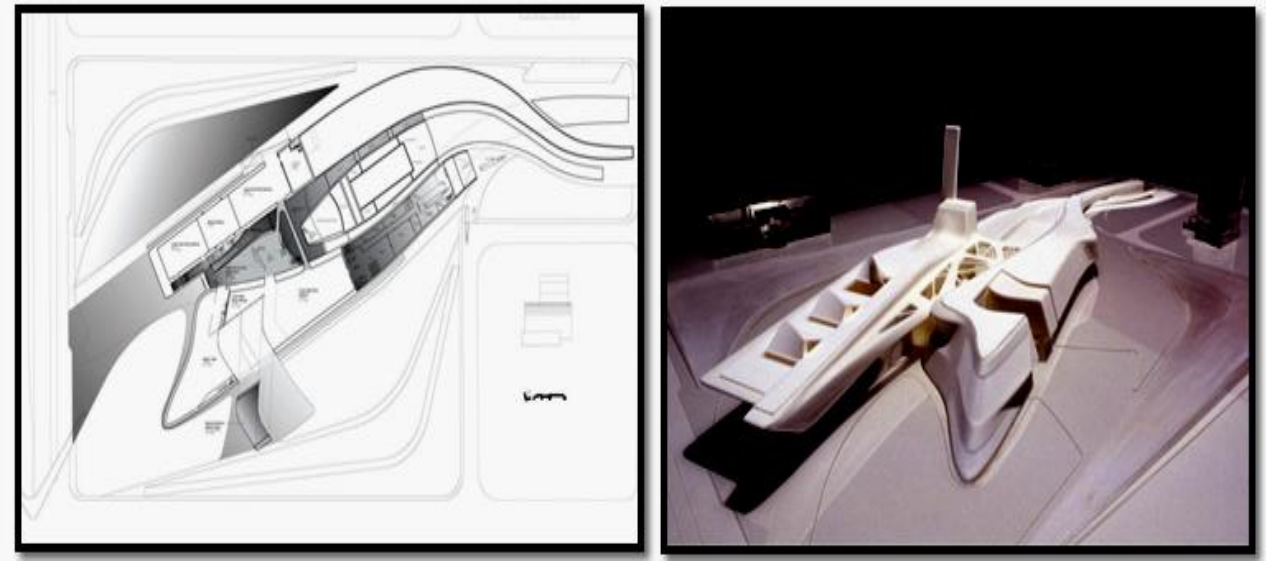


Fig.(8) right and left, Guggenheim Museum by Zaha Hadid.
solomon r. guggenheim foundation(2006)Guggenheim MuseumRetrieved fromzaha-hadid.com on 29/1/2021

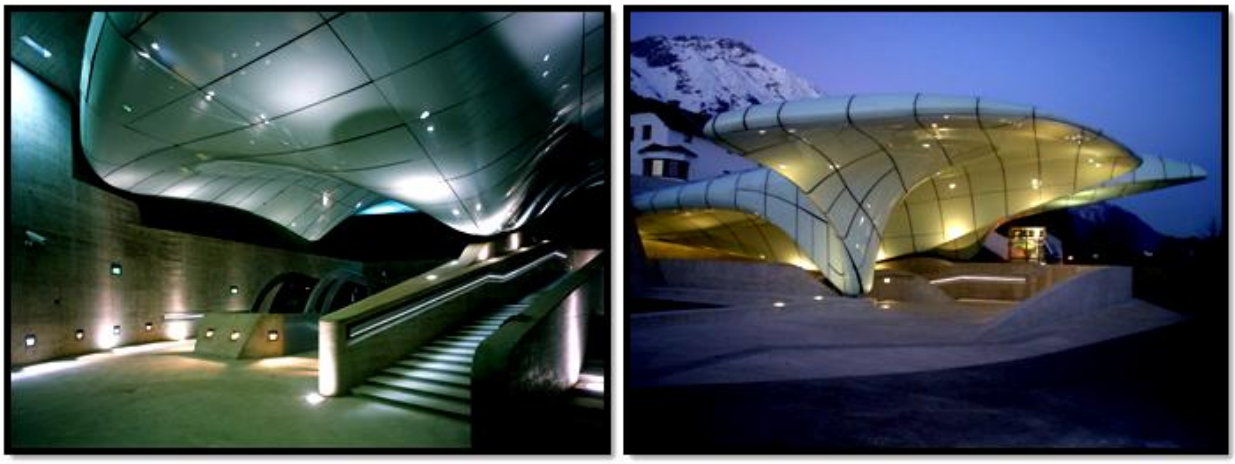


Fig.(9) right and left, Nordpark railway station design (Innsbruck, 2007) inspired by Fluidity Rivers and glacial formations by ZahaHadid.
Thomas Schielke, , 2017 Flui Luminosity: The Architectural Lighting of ZahaHadid
Retrieved from archdaily.com on 31/3/2017

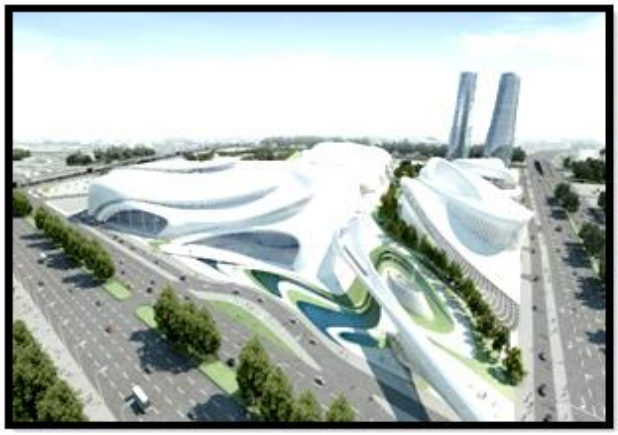


Fig.(10)to the left ,Cairo International Exhibition 2009 by ZahaHadid.
David Basulto(2014) Cairo Expo City / ZahaHadid Retrieved from archdaily.com on 29/1/2021

Fig.(11)to the right, HeydarAliyev Centre (Baku, 2013) Azerbaijan,
Thomas Schielke (2017) Fluid Luminosity: The Architectural Lighting of ZahaHadidRetrieved from archdaily.com on 10/1/2021

Fig.(12) fluid building by the designer Zaha Hadid.
Samsung C&T Global PR Manager(2017)INNOVATIONS 'Queen of the Curve'Zaha Hadid's Legacy of Fluidity Lives on Retrieved from samsungcnt.com on 10/1/2021

Fluid furniture:

The concept of fluidity affected furniture designers, so they created various furniture units and lighting units fluid in form and used advanced computer programs to design innovative and unusual shapes, such as designers:

•Zaha Hadid designed many furniture units that are characterized by dynamism and fluidity that flow in an innovative aesthetic form (19-22) Fig .(13-16).

•Daan Mulder furniture collection in Amsterdam, Netherlands. Create a collection of furniture and follow the architectural rule - form follows function. And he designed the suitable sofa (for dining and meetings) curved and covered with a steel veneer that was placed in layers and sprayed afterward, as well as another unit of multiple layers of strong, thin wood, then covered with oak veneer and coated with glossy varnish (24).

•Furniture units designed by designer Igor Solovyov, the streamlined bionic chair, and the bionic chair, designed as one piece with no apparent difference between the legs and arms or even the backrest and the seat (25).

•Furniture units designed by Emmanuel Babel such as a low organic coffee table (26) Fig .(17-19).

Fig (13)to the left,lighting unit from Beijing Galaxy Shopping Center .
Zumtobel Lighting GmbH (2021) Symbiosis of organic lines and dynamic modulation of light coloursretrived from zumtobel.com on 29/1/2021

Fig (14)to the right ,zahahadid fluid bench.
Courtesy of Tortona Design Week (2013) Serac Bench for LAB 23 | ZahaHadid Architectsretruved from arch2o.com on 22/1/2021

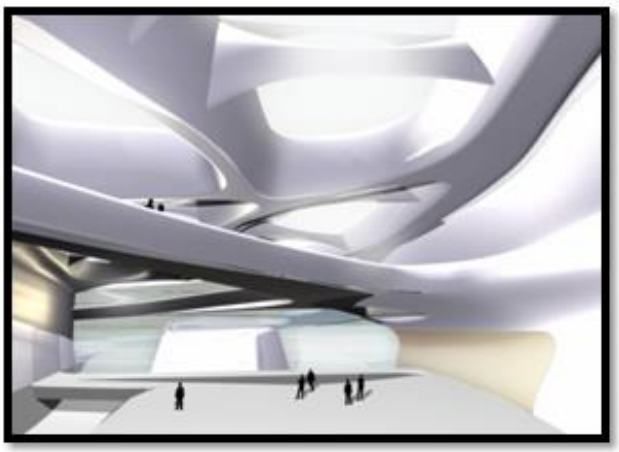


Fig (15) to the right fluid lamp of zaha hadid.
CODREANU ANDREEA(2013)ZahaHadid for Slamp: Aria and Avia Lamps Unveiledretrived from homesthetics.net on 26/1/2021

Fig (16) to the left, form in motion.
solomon r. guggenheim foundation(2006) Guggenheim Museum Retrieved from zaha-hadid.com on 29/1/2021

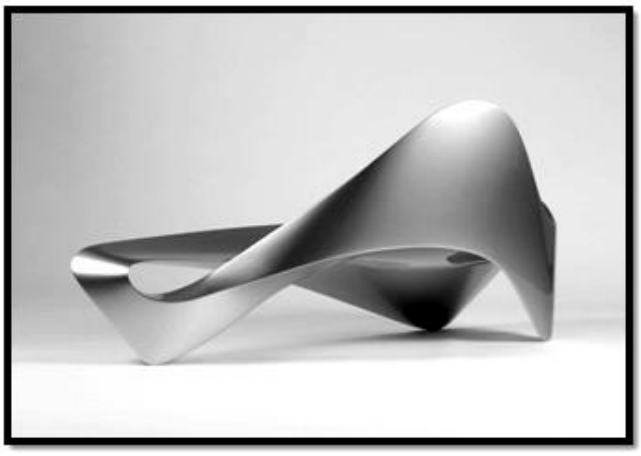


fig (17)Daan Mulder fluid furniture.
DaanMulder(2015)Form Follows Function: A Fluid Furniture Collection by Daan Mulder Interior Architecture & Furniture Design retrieved from livinspaces.net on 17/1/2021

fig (18)Igor Solovyov fluid furniture.
Igor Solovyov (2016)Bionic armchair retrieved from coroflot.com on 11/1/2021

fig (19)Emmanuel Babled fluid furniture.
Emmanuel Babled (2021) Unique Coffee Table in Organic and Fluid Form – Quarkretrived from marvelbuilding.com on14/1/2021.

The Concept of Fluidity and its Role on Formulating the Scenic Design

Experiences in the current era have gained great importance for designers and artists, as we see their effects in all fields until recently, the field of experimentation was limited to scientific fields without artistic fields, then it expanded to include various fields of science, and designers started to keep track of everything new through experiences and experiences in the field The arts in general and the design of the theater scene in particular, the designer took a method of research and experimentation as a starting point to achieve new visual concepts and visions that affect the consciousness of the recipients. Experimentation in art, even if it is consistent with the fundamentals of scientific experience, but differs from it in the vocabulary of the creative process and the nature of the resulting design (6).

Experience in theatrical design creates a new language for communicating with the recipient, and through experimentation in creating visual visions and renewable and innovative formulas. The great development in computer science has made a huge leap in creative thinking and the creative process. The computer provides endless solutions and designs of shapes and configurations that differ from traditional Euclidean shapes and produce designs with complex curves.

Thanks to scientists and experts, it is possible to take advantage of the advanced digital systems of modern programs such as (Maya, rhino, etc.) in a way that helps to design formations and installations with complex curves in a way that was not possible to design them using traditional methods.

According to the aesthetics of receiving from the point of view of "the aesthetics of reception", the meaning is produced by the spectator during the act of receiving. Also, the design presentation is a reinterpretation from the perspective of the Scruton viewer (4).

Architect Joni Mitchell says about fluid architecture, "I see music in fluid architecture". (14) the researcher presented many of the proposed designs inspired by streamlined architecture with its complex curved structures in designing a theatrical scene suitable for ceremonial shows, fashion shows, lyrical, fictional, sports, and kinetic performances, and the following designs are characterized by their reliance mainly On structures with highly complex curves that give a sense of continuity, flow and movement in the whole figure, whether the movement in one or several directions was dynamically different, removing visual boundaries between vertical and horizontal elements.

The researcher suggests using advanced execution techniques in implementing scenes using additive manufacturing technology. By designing the flow scene with advanced computer programs, then converting it into a digital file with

a special extension on the 3D printer, The 3D printer prints the scene in layers that reach a resolution of several millimeters on top of each other, and they are bonded with special materials. Plastic can be used to make the scene.

The first scene:

The first scene: Herbert Marcuse says: "Behind the aesthetic lies the pent-up comparison between the sensual and the rational" (3). The researcher designed experimental theatrical scenes through different designs and compositions, manipulation of shapes and spaces, exchange, grouping, rotation, sequence, organization, deletion, and addition. The first design is inspired by the free shapes and formations of nature, such as mountains and dunes, and the shape is a streamlined design with complex curves, and the researcher designed it with three-dimensional computer programs suitable for holding ceremonial performances, carnivals, singing, and science fiction scenes. The design features intricate, curved textures that give the recipient a sense of the dynamism, flow, and movement of the entire scene. Figure (20).

The second scene:

Roger Scruton says: "What realizes art's aesthetics are the formal elements it contains, and this does not make us underestimate the importance of the content." (4).

The second design is inspired by the curved shapes of nature, and the design is based on the idea of fluidity and complex curves, which were designed by the researcher using advanced 3D computer design programs and making adjustments in the shapes and directions of the curves to obtain more complexity from the first design (Fig. 21).

The third scene:

The researcher designed the third scene in a more complex and streamlined way, and the researcher used advanced computer programs to design it, with a design with complex interlocking curves that could not be designed with traditional techniques (Figure 22).

Fourth scene:

The design increases in complexity through the intertwining relationships between its vertical units that make up the scene, inspired by the concept of fluidity with the increase in curves and flows in shapes and their intersections, as each wraps around the other in a multidirectional movement (Fig. 23)

.The fifth scene:

In the fifth scene, the design becomes more complex due to the interrelationships between the units and the curved structures that make up the scene, inspired by streamlining with increasing curvature and tend to flow in shapes and their intersections in a multi-directional movement (Fig. 24-25).

All of the above scenes are suitable for various theatrical productions such as musical and dramatic theater productions, among others.

Figure (20) The first proposed elevation design that is inspired by the fluidity concept.

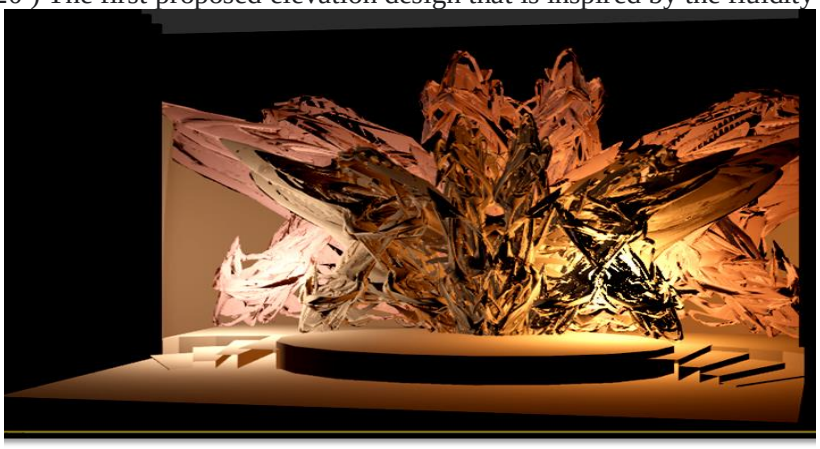


Figure (20b) The researcher designed the first scene with high curvature shapes inspired by the flow concept in the design .

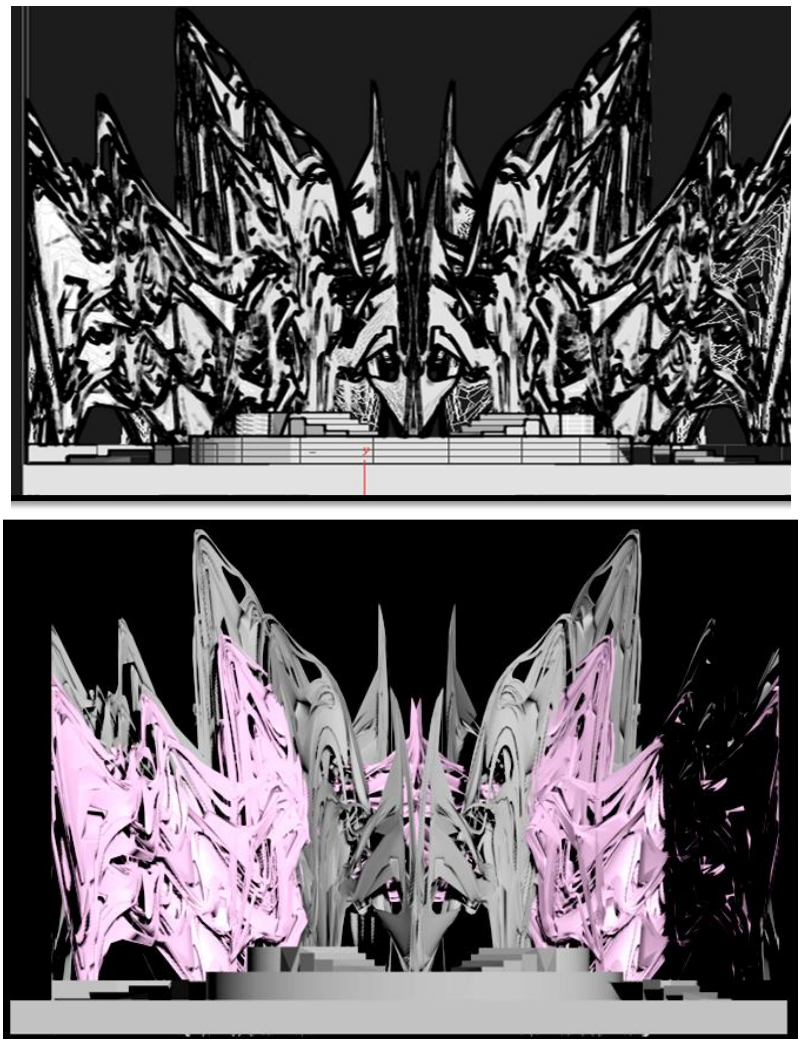


Figure (21) The second proposed elevation design that is inspired by the fluidity concept.

fig(21b)The second design is inspired by the curved shapes of nature, and the design is based on the idea of fluidity and complex curves.

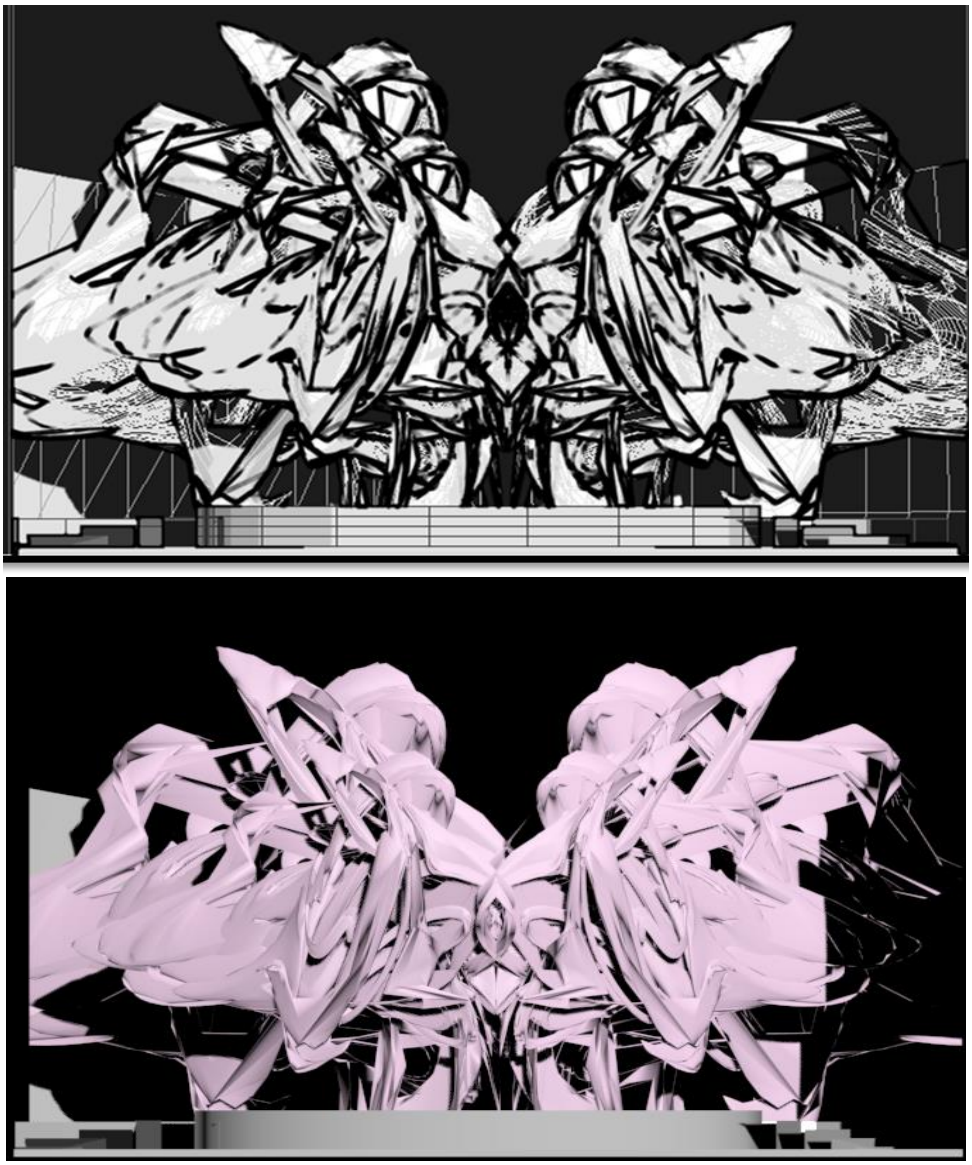


Figure (22) The third proposed elevation design that is inspired by the fluidity concept.

fig(22b)the researcher designed the third scene in a more complex and streamlined manner .

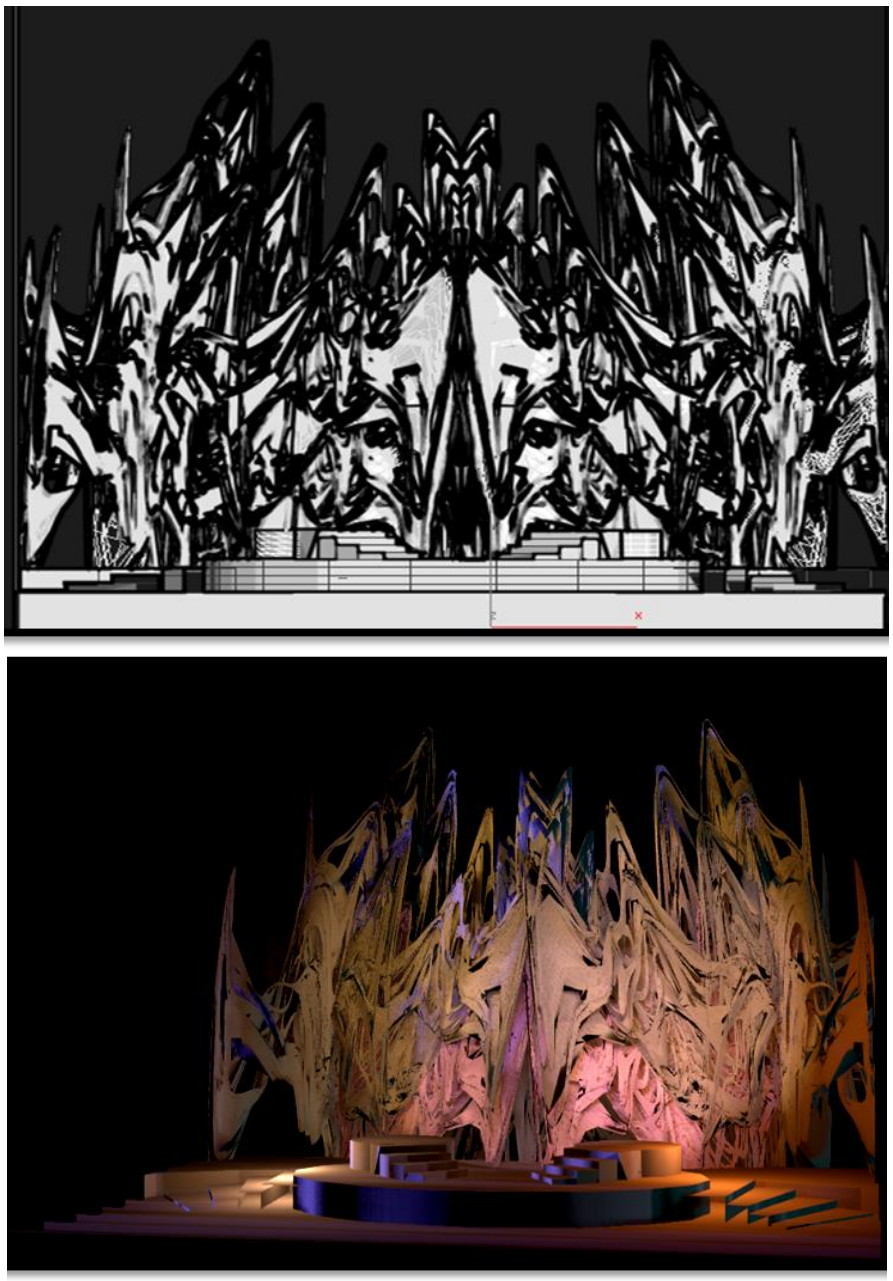


figure (23b)The fourth design tends to complicate the interrelationships between its vertical units that make up the scene, inspired by the concept of fluidity.

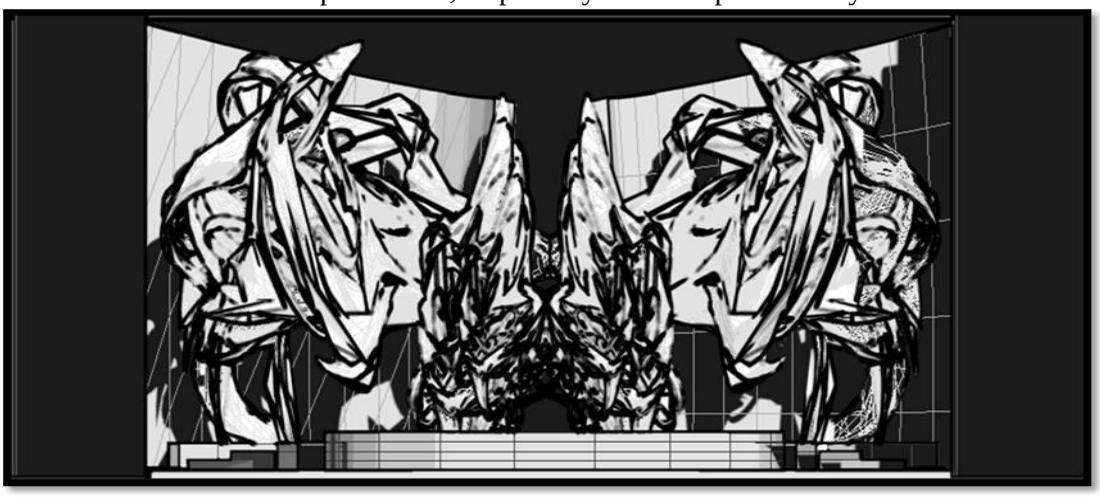


Figure (24a) The fifth proposed elevation design that is inspired by the fluidity concept.

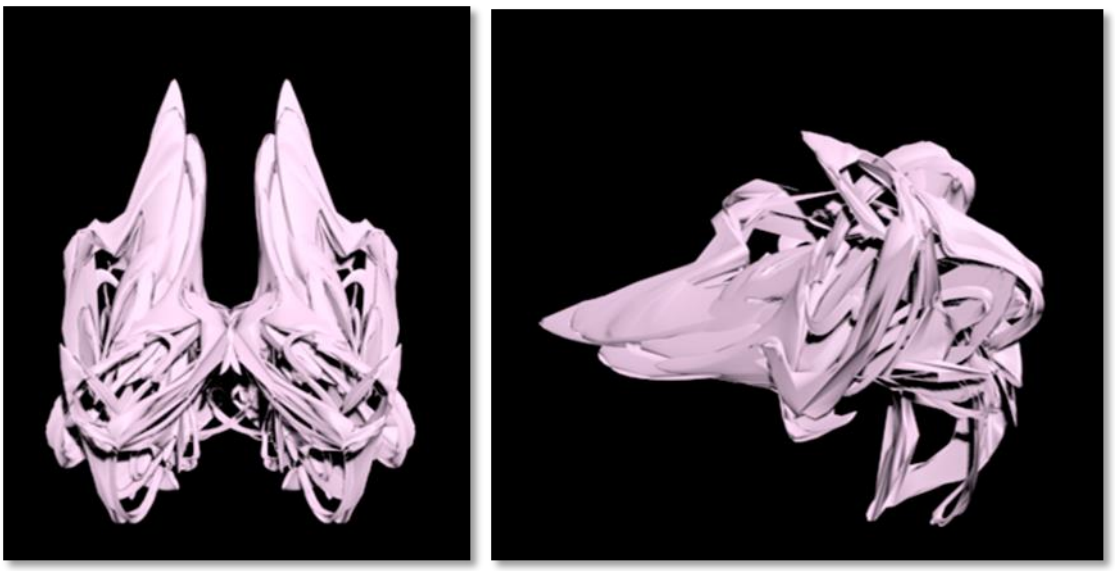


Figure (24b) The fifth proposed elevation design that is inspired by the fluidity concept.

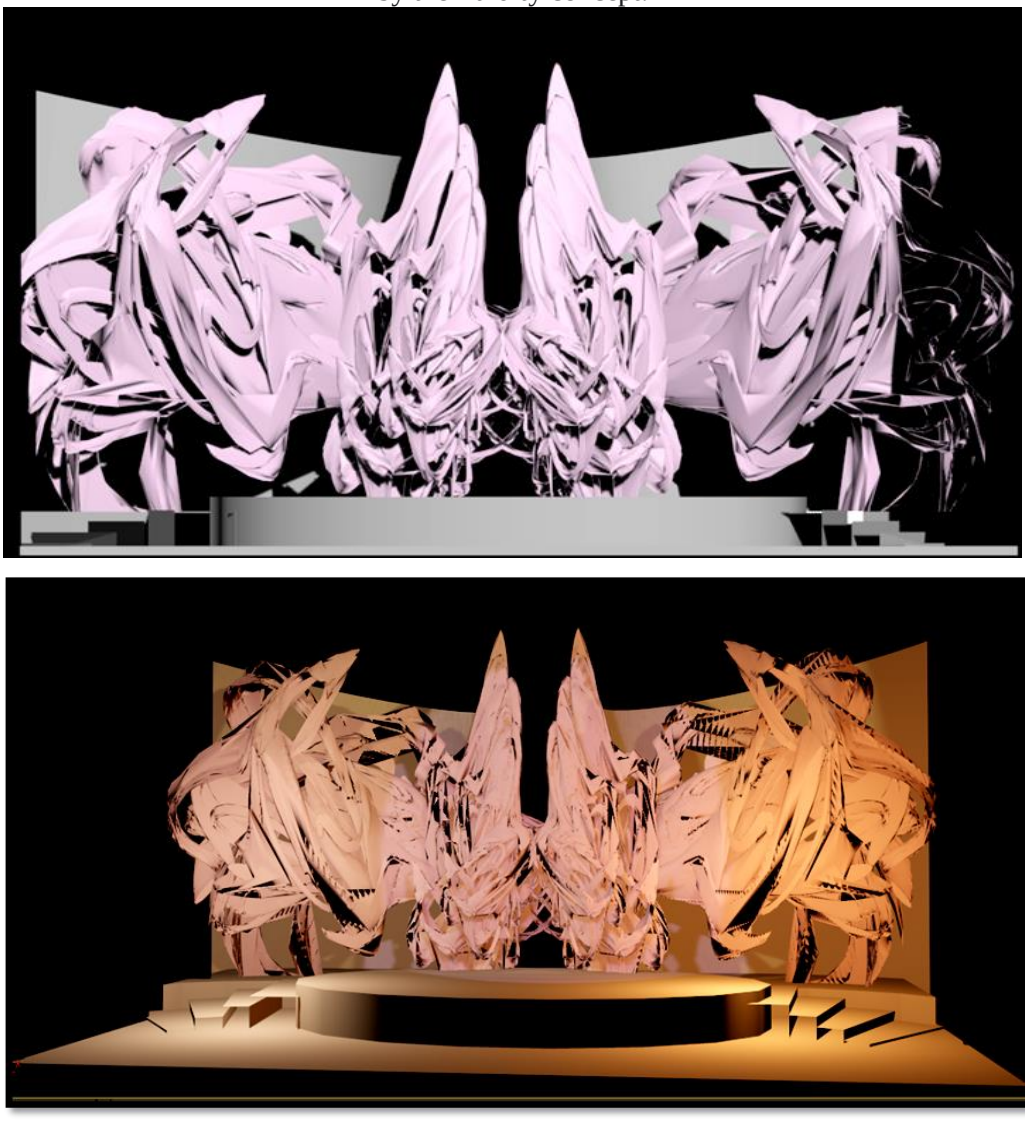
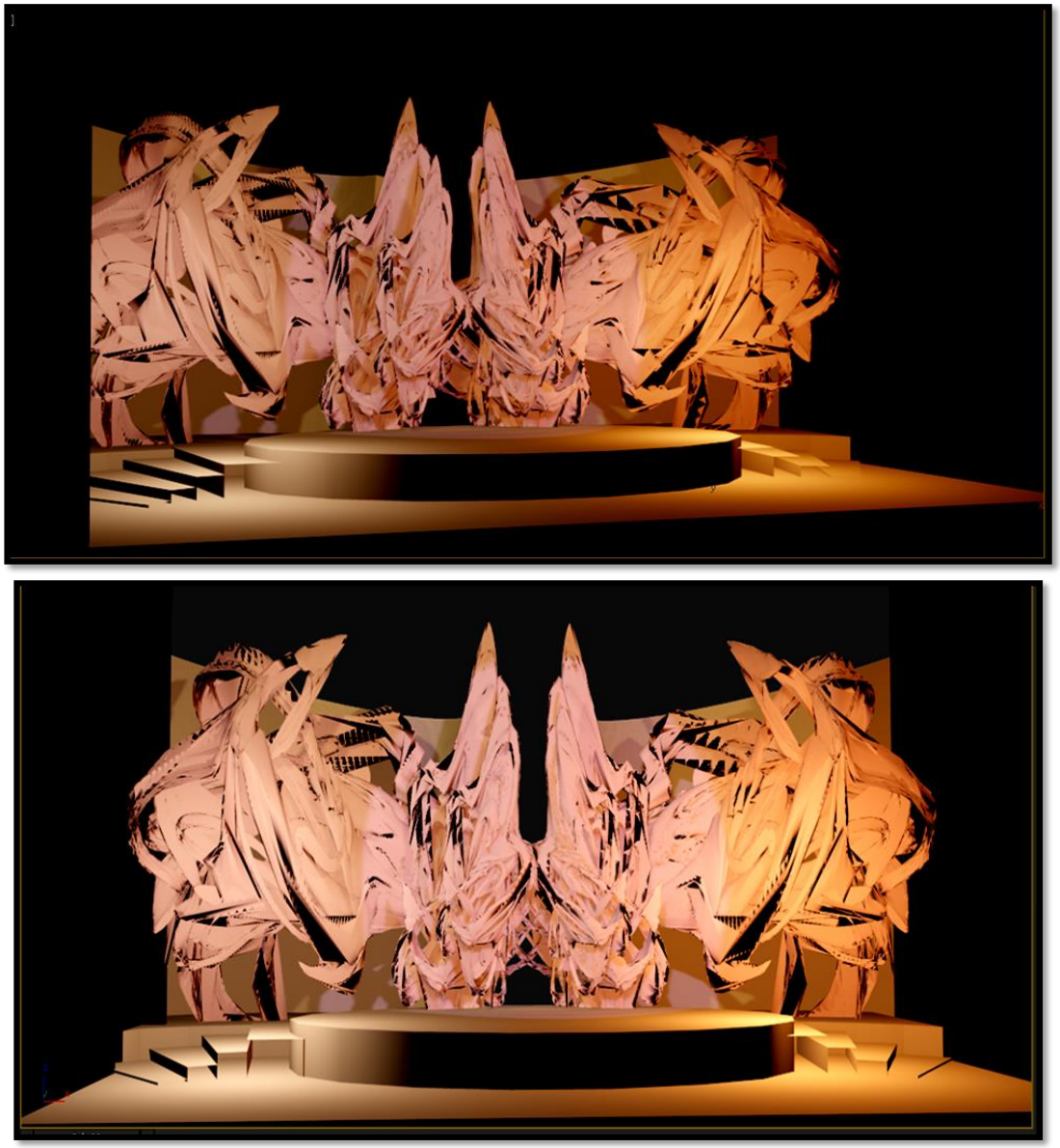


figure (24b)above the elevation ,bottom the 3d design has become more complicated by the interrelationships between its curved units that make up the scene, inspired by the fluidity .



fig(2) some shots of the fifth proposal scene inspired b fluidity.

Results:

- Natural systems have inspired humans since they began to build and design, and designers have benefited from them in creating innovative designs inspired by nature.
- The digital revolution and the development of computer software in the 21st century have given rise to many complex designs and trends.
- The concept of fluidity is one of the modern trends in design, and the possibility of taking advantage of the streamlining trend in forming a theatrical scene with highly complex sculptural formations and curves, in a way that allows creating new visual and intellectual formulas that enrich the process of designing the scene, which cannot be designed and implemented using traditional design techniques.

Recommendations:

- The necessity of expanding the study of advanced computer programs in the field of scene design and following up on all the developments taking place in them, due to their ability to create various and unfamiliar designs.
- The need to pay attention to studying the trend of fluidity and its application in the field of theatrical scene design, one of the advanced trends that will open new horizons for theater designers and various theatrical performances.

References:

1. Hussein Ashraf. & others, (2019), The Philosophy of Cosmic Architecture and its Relation to Architecture and Interior Design, *Journal of Architecture and Arts*, number 16, retrieved Jan 2, 2021 from

https://www.aaciaegypt.com/wp-content/uploads/2019/07/The-Philosophy-Direction-of-Cosmic-Architecture-and-Its-Relation-to-the-pdf.

2. KalayciPinar (2019), LIQUIDITY AS A NEW CONCEPT IN ARCHITECTURE AND ARCHITECTURAL EDUCATION: ARCHITECTURES BY STUDIO THINKIMAGINE, Conference: LIVENARCH VI , Trabzon, Turkey, retrieved Jan 3,2021 from https https://www.researchgate.net/publication/336134421_LIQUIDITY_AS_A_NEW_CONCEPT_IN_ARCHITECTURE_AND_ARCHITECTURAL_EDUCATION_ARCHITECTURES_BY_STUDIO_THINKIMAGINE.
3. Marcuse Herbert, (1974), Eros and civilization, New Ed Edition, Beacon Press.
4. Scruton, Roger,(2009), Beauty , *Oxford University Press*; 1st Edition.
5. Sweidan,Abeer,(2017), The concept of fluid architecture and its impact on interior design and furniture in light of advanced digital technology, *Journal of Architecture,* Arts and Humanities, Volume 2, Issue 8, page 403-414, retrieved Jan 4,2021 from https://journals.ekb.eg/article_21664_d48bb6d58f86805e6425c8f5def5dffc.pdf
6. Wolff Janet,(1993*), Aesthetics of Sociology of art* , Palgrave.
7. Verstegen Ian,(2005), *Arnheim, Gestalt and Art :A Psychological Theory*, Springer-Verlag Wien.

Web sites:

8. Dictionary.cambridge.org.2020."FLUIDITY: *meaning in the Cambridge English Dictionary." https://dictionary.cambridge.org/dictionary/english/fluidity(Oct 21, 2020).*
9. *Lexico.com."Fluidity : Definition of Fluidity by Oxford Dictionary." https://www.lexico.com/definition/fluidity.*
10. *Acsa-arch.org,Architecture and the Image of Fluidity,https://www.acsa-arch.org/proceedings/Annual%20Meeting%20Proceedings/ACSA.AM.102/ACSA.AM.102.5.pdf.(27 sep, 2020).*
11. *Miragestudio7.com . 2019."Frank Gehry Quotes On Liquid Architecture, Space And Gravity." https://blog.miragestudio7.com/frank-gehry-quotes/6541/ D8%A7%D8%8C%20%D8%AC%D9%85%D8%B9%20%3A%20%D8%B3%D9%88%D8%A7%D8%A6%D9%84(30 January, 2020).*
12. *Nasain arabic.net, 2018,What are bosons and fermions? and What is the difference between them? ., https://nasainarabic.net/main/articles/view/what-is-the-difference- between-bosons-and-fermions?fbclid=IwAR2IrXQPbu7gKuZkk-aMmpzBgPErizwJm7vyWOxedd3AKLqfvq3Clnlq2xk (28Dec, 2018).*
13. *Researchgate.net. 2018."Defying Gravity in ZahaHadid'sArchitecture ,https://www.researchgate.net/publication/329659441_thdy_aljadhbyt_fy_mart_zha_hdyd (20 Aug, 2020).*
14. *Meaningin.com." I see music as fluid architecture, https://meaningin.com/quotes/joni-mitchell/3454-i-see-music-as-fluid-architecture. (15 Oct, 2020).*
15. *Researchgate.net.2013, ZahaHadid Form Making Strategies For Design, https://www.researchgate.net/publication/283347344_Zaha_Hadid_Form_Making_Strategies_For_Design.(12oct,2020)*
16. *Archdaily.com .https://www.archdaily.com/868157/fluid-luminosity-the-architectural-lighting-of-zaha-hadid.(15 Oct, 2020).*
17. *Researchgate.net,https://www.researchgate.net/publication/333678251_flsft_alastlham_mn_altbyt_fy_altsmym.(10 Oct, 2020).*
18. *http://news.samsungcnt.com/queen-of-the-curve-zaha-hadids-legacy-of-fluidity-lives-on/*
19. *https://www.zaha-hadid.com/architecture/galaxy-soho/*
20. *https://www.arch2o.com/serac-bench-for-lab-23-zaha-hadid/*
21. *https://homesthetics.net/zaha-hadid-for-slamp-aria-and-avia-lamps-unveiled/*
22. *https://www.zaha-hadid.com/architecture/guggenheim-museum/*
23. *http://news.samsungcnt.com/queen-of-the-curve-zaha-hadids-legacy-of-fluidity-lives-on/*
24. *https://www.livinspaces.net/design-and-style/product-design/form-follows-function-daan-mulder-interior-architecture-furniture-design/*
25. *https://www.coroflot.com/igorsolovyov/Bionic armchair?epik=dj0yJnU9LUdBZG8tNE9seU5uT1hHOWtKXy1MajZVTFU2VnhJN04mcD0wJm49NldYblBudFpvV0c5d20tLUVIUzFjdyZ0PUFBQUFBR0FWcUY0*
26. *http://www.marvelbuilding.com/unique-coffee-table-organic-fluid-form-quark*.html