| Ferhan KIZILTEPE | Paper : A BRIEF ESSAY ONTO ZAHA HADID'S ARCHITECTURE FROM A DIFFERENT PERSPECTIVE |

Topic: Architecture, Mathematics

Authors:
Ferhan KIZILTEPE
Anadolu University, Faculty of Architecture and Design
CHD (Contemporary Sculptors Association)
Turkey
www.ferhankiziltepe.com

References:
 [1] Boyut Kitapları, "*Çağdaş Dünya Mimarları 9, Zaha Hadid*", Boyut Matbaacılık A.Ş., İstanbul,2000
[2] Patrik Schumacher, Gordana Fontana- Giusti, "*Zaha Hadid/ Complete Works* ", Thames & Hudson, London, 2004
[3] Violet Law, "The Progressive: *Zaha Hadid*", The Progressive Inc., Online Issues,2008
[4] Building Design, "*Buildings Zaha Hadid Architects: Progressive Rock*", UBM Information Ltd, London,2012

Contact:
aser@ferhankiziltepe.com

Abstract:

As a matter of fact, architecture that has been produced throughout the human history carries the knowledge of the society that it was created in to our present time. Among these, works of architecture have a critical place in our understanding of both ourselves and our historical development. Architecture which can also be defined as an elegant harmony between science and art in all their elements from technique to aesthetics, presents us with a vast field of research in its own right.

This article presents general and technical information regarding Zaha Hadid who enjoys a significant place in today's architecture, and who is defined as one of the deconstructivist architecture with her approach and her works while no emphasis has been placed on the technical, aesthetic and historical values she has from an architectural point of view. This article aims to analyse Hadid's architectural works from a different perspective, and to trace geometrical forms which are thought to be present in Zaha Hadid's architectural style. Also the method of comparison will be used in the discussing of the subject within the scope of this article; the first results of this study not yet completed, and only planned to be shared with readers and listeners.

Zaha Hadid, Guangzhou Opera House, Guangzhou, China, 2010

http://www.zaha-hadid.com/wp-content/files_mf/01062_cp_ib_n2_higha4.jpg

Keywords: Zahar Hadid, Deconstructivist, Architecture, Amorphous, Curves, Geometrical Forms

A Brief Essay onto Zaha Hadid's Architecture from a Different Perspective

Ferhan Kızıltepe, B.Sc., M.A.

Anadolu University Faculty of Architecture and Design

www.ferhankiziltepe.com

e-mail: aser@ferhankiziltepe.com, fkiziltepe@anadolu.edu.tr

Abstract

As a matter of fact, architecture that has been produced throughout the human history carries the knowledge of the society that it was created in to our present time. Among these, works of architecture have a critical place in our understanding of both ourselves and our historical development. Architecture which can also be defined as an elegant harmony between science and art in all their elements from technique to aesthetics, presents us with a vast field of research in its own right.

This article presents general and technical information regarding Zaha Hadid who enjoys a significant place in today's architecture, and who is defined as one of the deconstructivist architecture with her approach and her works while no emphasis has been placed on the technical, aesthetic and historical values she has from an architectural point of view. This article aims to analyse Hadid's architectural works from a different perspective, and to trace geometrical forms which are thought to be present in Zaha Hadid's architectural style. Also the method of comparison will be used in the discussing of the subject within the scope of this article; the first results of this study not yet completed, and only planned to be shared with readers and listeners.

1. Zaha Hadid

Zaha Hadid, one of the foremost architects of today, considered to be among the deconstructivist architects of today's architecture. At the same time, it can be observed certain impacts of suprematism on some of her works such as Vitra Fire Station (Weil Am Rhein, Germany, 1990-1994), Museum of Islamic Arts (Doha, Qatar, 1997), Kurfürstendamm 70 (Berlin, Germany, 1986), MAXXI / National Museum of Contemporary Arts (Rome, Italy, 1997) [1] ; and on some other projects it can be seen the traces of Russian constructivism, such as The Hague Villas (The Hague, Netherlands, 1991), Blueprint Pavilion (Birmingham, England, 1995), Phaeno Science Centre (Wolfsburg, Germany, 1999) [2]. Especially, when one considers her works, which carry certain characteristics of a non-Euclidean geometry, some Russian constructivists such as Naum Gabo and Antoine Pevsner can come to mind.

From left to right: Vitra Fire Station [6]. *MAXXI: Museum of XXI Centry Arts* [7].

From left to right: "Construction in space: Arch No:2, Naum Gabo [8]. *Dynamic Projection at Thirty Degrees, Antonie Pevsner* [9].

Hadid was one of the architects whose works exhibited at MoMA[5] in 1988, under the name of Deconstructivist Architecture [3]; it can be said that Hadid is stand out whether today's architecture or among the deconstructivist architects, by her understanding of forms, and the works which were look as if they were hanging on air despise the gravity.

From left to right: Haydar Aliyev Center [10]. *King Abdullah Financial District Metro Station* [11].

In architect Uğur Tanyeli's arcticle called "Zaha Hadid ve Decostrütif Söylemin Eleştirisi," he treats Hadid from modernism and postmodernism perspectives, and notes "At least Hadid is on the 'edges' more then the others." [4]. Hadid masterly uses different geometric factors such as hyperbolic geometry, elliptic geometry on her works and this is one of the reasons why her works are differentiates then the others. Thus, it can be easily build a symbolic analogy between Hadid's bulks, Euclidean and non-Euclidean geometry.

---

[5] The exhibition was held between June 23- August 30; other architects were P. Eisenman, F. Gehry, D. Libeskind, B. Tschumi and R. Koolhass.
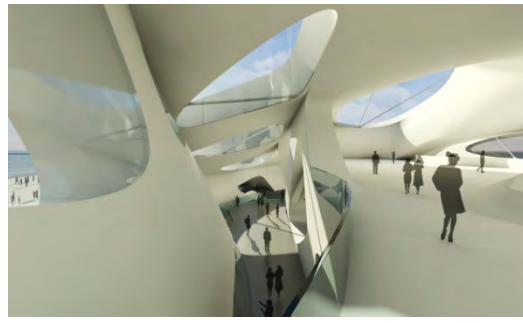
From left to right: Nuragic and Contemporary Art Museum [12].

This paper will share the initial discoveries on Hadid's works, and since her forms and their geometric relations will be examined, it will be appropriate to give a brief geometric explanation as well.
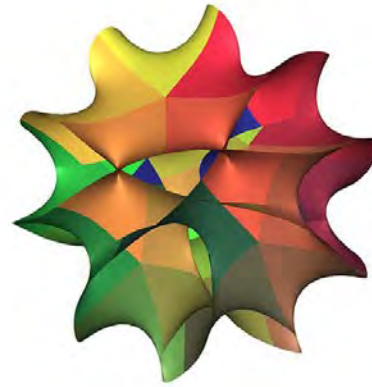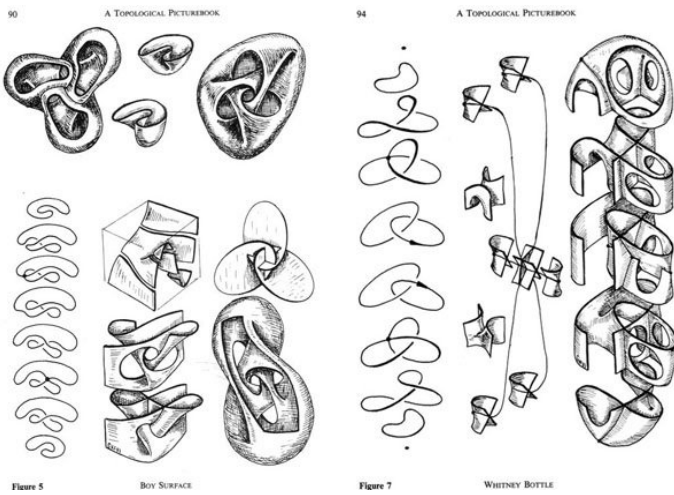
2. Euclidean Geometry and Non-Euclidean Geometry

If it's necessary to mention what geometry means, briefly it can be said it's one of the branches of math, which considers shapes, objects and volumes (or spatial relations). First recordings of geometry can be found in a papyrus of 1550 B.C., and since then scientists are trying to improve it. One of those scientists and maybe the most known one is Euclid the Alexandrian, whom was believed the president of Alexandrian Library. Euclid combines all the scientific studies before him and his own studies, and publishes as a 13-volume geometry book under the name of *Elements*, which explains geometry's main lines. It consists of 5 axioms, 5 postulates, 23 definitions and 48 assertions and also defines what Euclidean Geometry is.
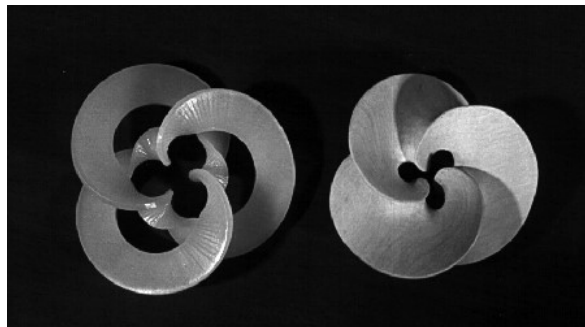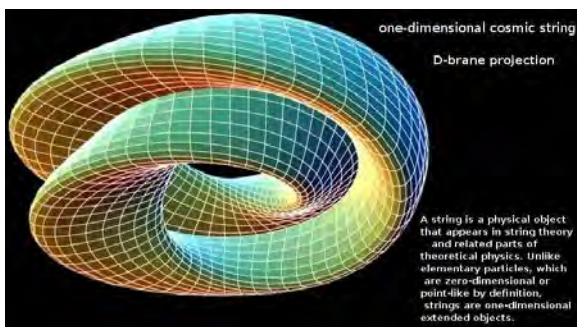

From left to right: Cosmic String [13]. *Three Knots and Twists on a Trefoil Knot* [14].

The 5th postulate, also known as parallelism postulate, can be found in Euclid's *Elements,* is one of the most influential works in the history of mathematics, it has a very important place in the development of geometry especially in the 16th century andlater. That postulate goes like this: "That, if a straight line falling on two straight lines make the interior angles on the same side less than two right angles, the two straight lines, if produced indefinitely, meet on that side on which are the angles less than the two right angles." [5]. Throughout the history scientists are worked whether to prove this postulate, or make it more understandable or to discover alternative new one. After the 16th century and later, these studies lead a great part in non-Euclidean geometry's birth.

From left to right: Boy Surface, Whitney Bottle [15]. *Calabi- Yau Quintic Manifold*[16].

As it's been touched upon above, it can be argued that hyperbolic and elliptic geometries in non-Euclidean geometry are part of Hadid's forms. Let us explain what is hyperbolic and elliptic geometries are. Hyperbolic geometry while accepting some of Euclid's axioms, uses a different one for the 5th postulate, "it can be drawn an infinite number of coplanar lines to a line and sum of the angles of a triangle is less then 180o." The elliptic geometry also accepts Euclid's axioms, and instead of the 5th postulate they use "it cannot be drawn an infinite number of parallel lines to a line and sum of the angles of a triangle is greater than 180o."
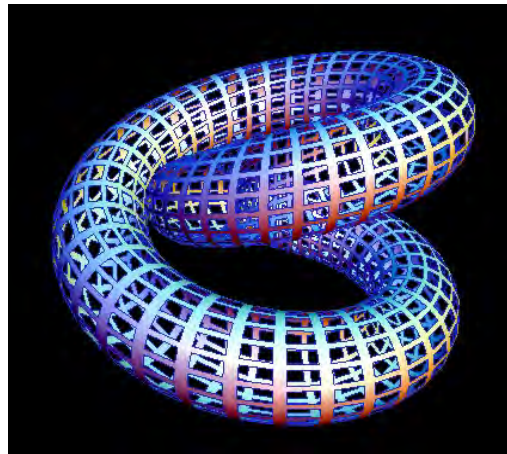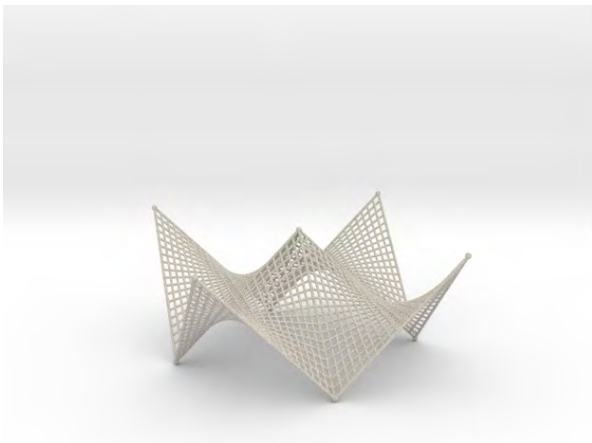
From left to right: Hyperbolic Paraboloid Doubly Ruled Shelter [17].*Toroid* [18].

3. Conclusion

This paper attempts to discuss the initial geometric discoveries on the projects of, rather incongruous architect of nowadays architecture, Zaha Hadid, mostly by building visual symbolic analogies. Hadid is one of the deconstructivist architects, it can be noticed that his works carry certain traces of constructivism and suprematism, and also they stand out by the use of different geometry. One of the main research questions on Hadid who received a classical architecture education, is that the reasons behind his contemporary architects different approaches towards geometry. The answer is considered on that his education rather than his Iraqi-British roots.

References

[1], [2] Z.Hadid, A. Betsky, *Zaha Hadid: The Complete Buildings and Projects,* Thames & Hudson Ltd., 176 pp. 1998. London

[3] http://www.moma.org/learn/resources/press_archives/1980s/1988, [19.11.2015]

[4] Boyut Yayınları, *Çağdaş Dünya Mimarları 9, Zaha Hadid*, Boyut Matbaacılık AŞ., 142pp.2000.İstanbul

[5] www.greenlion.com/Eu-I-1-7,[20.11.2015].

[6] http://www.zaha-hadid.com/architecture/vitra-fire-station-2/, [20.11.2015].

[7] http://www.zaha-hadid.com/architecture/maxxi/, [20.11.2015].

[8] http://www.naum-gabo.com/, [20.11.2015].

[9] http://www.nashersculpturecenter.org/art/artists/artist.aspx?id=3753, [20.11.2015].

[10] http://www.zaha-hadid.com/architecture/heydar-aliyev-centre/, [20.11.2015].

[11] http://www.zaha-hadid.com/architecture/king-abdullah-financial-district-metro-station/, [20.11.2015].

[12] http://www.zaha-hadid.com/architecture/nuragic-and-contemporary-art-museum/, [20.11.2015].

[13] http://msnlv.com/string-theory.html/, [20.11.2015].

[14] http://ceadserv1.nku.edu/longa//classes/2012spring/mat115/days/day22.html, [20.11.2015].

[15] G. K. Francis, *A Topological Picturebook,* Springer- Verlag, xii+194 pp. 1987. Virginia

[16] https://en.wikipedia.org/wiki/Calabi%E2%80%93Yau_manifold, [20.11.2015].

[17] http://www.shapeways.com/product/B42EM9GU4/hyperbolic-paraboloid-doubly-ruled-shelter-roof?optionId=16166881, [20.11.2015].

[18] https://commons.wikimedia.org/wiki/File:Toroid.png, [20.11.2015].