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## STUDYING THE EFFECT OF THE EVOLUTION OF DOME CHAMBER ON THE PROCESS OF LIGHTING AND TRANSPARENCY OF IRANIAN MOSQUES ARCHITECTURE\*

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**Statement of the problem.** The Lord is the brightener of heavens and earth. All the lights are his, some are visible and obvious, some hidden and invisible. Although visible light like sunlight and moonlight is obvious, it depends on the hidden light, and there will be Solar and lunar eclipses for them. Life is emergence and light. In addition, light is inherently percipient of itself, and mercy of universe. Everything in the world is either light or darkness. Light has two types, abstract light, and exhibitor light. Abstract light is also called pure light. Existence of exhibitor light is from others and it reveals others.

**Results.** In the Islamic art and architecture, light has had a special place. In addition to its function, presence of light has been at the center of attention in terms of ideological discussions. The present study has used the library method.

**Conclusions.** By using written references and interpretation of Quran verses, it has been attempted to survey the role and position of light in the written sources of the Islamic architecture. Moreover, it has been tried to reveal the deep roots with which the Islamic art principles have been filled.

**Keywords:** Light, Transparency, Islamic Iranian architecture, Dome chamber.

### Introduction

In Islamic art, light is like a secret for spiritual wayfaring. As the artist is involved with materials, and their imaginary figures cannot be free from materials and tools, so their wayfaring

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can never be considered the same as the one for a mystic. In the other term, revealed face of mysticism can be seen in an artistic work where it is linked to materials, sensations, and a sense of multiplicity; it can also be seen on descending Order from poem to fine arts. Moreover, when an artist is freed from material and physical forms, they step into mysticism. It means that art will be the body of mysticism, and mysticism will be the soul and life of art. Lastly, they transfer special art to public art (Madad Pour, p. 36). Light has a special position in aesthetics and art. For example, the art of architecture has allocated a detailed discussion regarding using natural light. During various historical eras, daylight and the importance of making use of it in Iranian architecture and forming interior spaces has always enjoyed a special position. By the emergence of Islam, the importance and use of daylight in various architectural works have doubled. In addition to the functional aspects, taking advantage of the presence of light in the works is a factor for lighting and vivification of daily activities. Light, whether superficial or mystical, makes beauty being flaunted (Bemanian, 2014, p. 61). The brightness of Islam is in sincerity light. Moreover, the brightness of faith is in light of verity, brightness of beneficence in light of certainty, and sensual brightness; the prophet of Islam (PBUH) said, "There is a tree in heaven with each branch in each palace. The sun is its example on earth that gleams in every place (Meibodi, 2005, second vol., p. 128). Presence of light, especially in mosque that is God's house is manifested, and it has a significant role in reducing difficulty, roughness, and coldness of stones and building. Metaphysic display of light on the physic of the building has made it the main axis of the aesthetics of Islamic architecture in mysticism and meaning (Muhammadi, 2014, p. 7).

## **1. Definition of light in Islamic thought**

### **1-1. Light in Quran and Hadith**

There is a chapter in Quran, named light. In this Holy Scripture, the term "Light" has been repeated for forty-three times, and the term "Darkness" has been mentioned for twenty three times. Light is sometimes equivalence for Bible, Torah, and guidance. Moreover, sometimes, light and darkness have been applied in the meaning of sight and blindness. Sometimes, it has also been applied equal to the Prophet, religion of right and straight path, divine book, and Quran. It has also been used in the meaning of reward. Sometimes light is a sense. In some of the verses, light is the irony of faith, leader and guide, and darkness is irony of disbelief, wrong path, and aberration (Nour Bakhsh, Sima, 2005, pp. 10—41). "God has seventy covers of light and darkness, and if God removes the covers, glory and splendor of his nature will

burn eyes" (Nezhat, 2010). There is light of inspiration in the head of human, light of prayer among his eyes, light of certainty in his ears, light of expression in his tongue, and light of faith in his heart. In addition, there is light of gratitude of God in other creatures. If all the lights are lit together, there will be light on top of light, and God will let anyone he wishes into his light and brings him to unity and oneness. The prophet (PBUH) has said about this light that the worlds were a handful of soil, and were in their darkness. They were wandering in their dark nature, and they remained ignorant behind the curtain of creation. Suddenly eternity light rain began to fall from the eternal sky, the soil became fragrant, stone changed to gold, and the color of sky and earth changed (Meibodi, 2006, pp. 127—129). It has been mentioned in Prophetic Hadith "the first thing God created was light" (Nasr, 2010, p. 62).

## **1-2: light in the idea of Islamic elders, and Iranian thinkers**

### **1-2-1. Najm Razi**

About light, he says that "as you see anywhere in both worlds, you will see both light and darkness, and it is filled with the lights of his benignity and wrath traits (Madad Pour, p. 35).

Whatever has the sign of existence see, it is either shadow of his light, or him.

### **1-2-2. Ibn Heitham**

He, who is one of the first physicians of the science history of the world, has stated the relation between fitness, goodness, and beauty in his famous book, *Al-Manazer* (the Scenes). This great scholar of Islam has represented twenty-two factors to define and explain beauty (goodness), among which color and light beside fitness, to put it differently, have a special role; they were considered the components of beauty in the Islamic art and civilization. Ibn Heitham knew of light as an important factor that could have an effect on the ego to represent a beautiful face (Hassan Bokhari, 2006, pp. 28–29).

### **1-2-3. light in the idea of Suhrawardi**

Light is nothing but the emergence, and emergence is nothing but the reality of light, and there is nothing but the emergence of light. Light is brighter than everything, it does not have any material or season; therefore, there is no limit for it. As a result, needlessness of light is of definition of its nature essence. Regarding the origin of light, explaining the relationship between it and the light is visible, because wisdom is continuously going from Sensible to reasonable, and it is always trying to relate sensible and insensible symmetries of the world to each other, whether the symmetry is right or wrong (Hekmat, Hajizadeh, 2013, p. 10).

## 2. Light and transparency in Islamic Iranian architecture

What descends from the sky to the earth is light. This is the same Islamic thought that has immortalized our architecture throughout the history, has aligned with our architecture, and spiritualized our architectural atmosphere.

In Islamic Iranian architecture, light has been represented different from other art works, as if the expressive language of Muslim artist has utilized special codes in his narrations of the universe. Art is one of the ways of gaining knowledge on the universe. In fact, identifying various aspects of universe is not possible, except through observing (Nour Bakhsh, 2005, pp. 40—41). In addition, whatever does not prevent penetration of light is transparency. According to Mirmiran, transparency is one of the principles dominating the universe, and he knows of it as the permanent motion and evolution of the universe from the material quality to the spiritual quality. According to him, the global architecture has also been developed consistent with the principle of transparency (Mirmiran, 2000). Besides having a role in brightening inside the building, light is connected with Islamic architecture decorations. Iran Architectural decoration of all times is indicative of light and joy regardless of its accuracy and delicacy. Islamic artist uses some elements in decoration of buildings to be able to fulfill his lightening purpose, like using Muqarnas that is a sort of absorbing and scattering light in accurate and narrow degrees. Even, using special colors is effective in lightening the building. Scholars know of light as a mystic symbol and believe that a Muslim architect tries to apply and shape any material, so that light reflection and vibration affect it. In addition, light displays other decorative elements better and gives life to projects (Gorgani, seventh century, p. 49). In Islam, due to absolute presence of God, the principle of Islamic architecture manifestation is thinking about applying some designs and materials that reflect the most important symbol of manifestation, because application of idea and material in this worldview is the application of reflection, not originality. Therefore, a building must be the manifestation symbol of the absolute light of heaven and earth that is the only real existence. "God is the light of heavens and earth" (the Holy Quran, Noor chapter, 25). As the Islamic art is linked with the heavenly world, the element of light is treated as an allegory of the absolute existence manifestation (Maddad Pour, 2012, 279). In its manifestation, light in architecture is a like the symbol of divine presence and wisdom. Moreover, light is the spiritual substance that penetrates into the concentration of material, and changes it to a noble and worthy form that is a suitable place for human ego. The ego has capability to grow and root in the world of light. The role of light is clearing material and reducing stiffness and coldness of the holy architecture, so that it can be a shelter such as heart for the human spirit captured inside the heart of a material.

Table 1

*Symbolic conclusion of light in Iranian Islamic architecture*

An allegorical manifestation of the Absolute presence
A symbol of God's presence and wisdom
Like the spiritual essence
Mystical symbol
The spiritual dimension of mosque building

(Outlined by the author)

**2-1. Lightwell elements and light controllers in traditional architecture of Iran**

Light gives dynamic qualities to Islamic architectural decorations, and draws figures and designs into time. Light and shadow create severe contrasts, texture for painted stones and plaster and brick surfaces. Light passes through wooden Mashrabiyas, plaster and marble walls, painted glasses of windows, and it reveals the designs on the back and interior surfaces. It also creates a temporal and variable coverage by colors and shadows. These elements are studied in the traditional architecture of Iran from two perspectives. The first group is the controllers of light like types of awning, and the second group is lightwells. The first group adjusts the light entering the building and it is divided into two categories: those, which area part of building such as porch, and those added to building and considered decorative such as curtain. The elements proposed as light wells have different names but they are all light wells, including: vent, Shabak, latticed door and window, Jam Khaneh, Horno, sash window, Rowshandan, Freezokhoon, Goljam, Palkaneh, Fenzer, Pajang, and Tehrani. In contrast, there are some elements, such as the porch, curtain, sunshade, awning, and penthouse that control and adjust the light entering the building (Gorgani, 706, p. 49—50).

**2-2. Analysis of representation of traditional architecture of Iran utilizing the nature of light**

By passing through transparent and reflective surfaces, light can have a great effect on spatial sense, and it can display itself as the most vital element of architecture (Mayes, 2006, p. 258). Light not only determines the boundaries of spaces in Islamic architecture, but also provides the possible emergence of white solid buildings that are reflective of desert purity, and elimination of multiplicities in the sight of the unique God by the commandment of "there is not God, but Allah". Meanwhile, using colorful structures makes the expression of heaven moods on the earth possible. If while is a symbol of indeterminate unity, colors that are derived from

light are symbols of expression of unity in diversity and dependence of diversity on unity. Each color is a symbol of any status of light, and the light itself, while light is not restricted to that special color (Muhammadi, 2015, p. 7). Using porous surfaces and creating artistic highlights on the surface can create a sense of lightness and belonging. Moreover, shadows make delicate textures on surfaces, and motion is a tool for understanding the space. Its presence in architecture for creating space and comprehending space owes to the factor of motion. By creating dynamism and fluidity, light creates the sense of motion. In space, the observing eyes move and understand the space; and this change will be felt only when its source is a phenomenon that is understandable and time shows itself in space (Mayes, 2008, p. 258). In the Iranian architectural space, the hierarchy of light and darkness has been carefully used in the direction of motion and guidance from one space to another. In the hierarchy, the intensity of light and dark in spaces determine their significance.

The sequence of light and darkness is a talented means to actualize the spatial arrangement. Energetic, light, attractive, and expanding sections come closer to us, and vice versa, dark, silent, and devoid of energy spots are contracted in a sleepy tranquility. However, presence of each dark spot increases our thirst for getting to the nest light spot. An architect looks at spaces not just as a series of spatial events, but also as various lighting. By changing light, the still and tied up building will revive. Natural light has the properties of motion, being different, sequence and changes in moments naturally, that leads to motion, and mode changes in different times. In the Schultz's theory of universe space, the most fundamental section is a discussion of the relation of human and environment perception, their attitude to the environment. Based on this, the criteria for viewing the universal space and architecture have been raised, and other parts of work have been organized. Schultz calls these relations as symmetry, related distinctions, sequencing, internal and external sequencing, and continuity (Memarian, 2008, p. 326).

Table 2

*Effect of light on some of Islamic architecture elements*

Space	Has a great effect on spatial sense
	Creation of space
	Comprehension of space
	Actualizing spatial arrangement
	Hierarchy of light and darkness in the direction of motion and guidance of spaces
	Intensity of light and darkness in the spatial significance

End of Table 2

Motion	Creates the sense of motion by creating dynamism and fluidity
Building decorations	Displays decoration elements better
	Gives life and spirit to designs
	Gives a dynamic quality to Islamic architecture decorations
	Draws patterns, figures, and designs into time
	Creates a temporal coverage of colors and shades
Building surfaces	Gives texture to surfaces
	Create the sense of lightness and belonging on surfaces
	Light and shadow create intense contrasts on surfaces

(Outlined by the author)

### 3. The position of light manifestation in Iranian Islamic architecture

#### 3-1. Mosque

The first position of Iranian Islamic art manifestation is the architecture of mosques, where is a place and space to connect to the Light of Lights. In fact, here, the real meaning of architecture that is (architecture is the art of arranging space) will be revealed (Abbasi, Noushadi, 2013, p. 6). If white is the symbol of indeterminate unity, the colors obtained from the sun are symbols of expression of unity in diversity and dependence of diversity on unity. Each color is a symbol of any states of light and the light itself, without the light being restricted to that special color (Muhammadi, 2015, p. 7). Mosque is one of the spaces where its spiritual dimension is shown by means of light, shadow, and decorations (Saadat, 2014, p. 4). In the Islamic architecture book, Robert Halen Brand knows mosque as the display of all Islamic architecture secrets and the heart of this architecture. Moreover, he believes that "from the beginning, its symbolic role was comprehended by Muslims and the role played its share in creation of appropriate visual indicators for the building among which domes, minarets and pulpit can be mentioned" (Rahbarnia, Roubahani, 2015, p. 4). Making use of natural light element is one of the ways of showing feelings, the one that is transferred from the designer or creator to the observer. In addition, concepts like sense of presence, motion, concentration etc. can be transferred through blurs and lights without verbal communication and direct relationship, and make more focus. Moreover, that is exactly what the creator of Iranian Mosque is correctly aware of (Bemanian, Aali Nasab, 2009, p. 11). The main part of lighting of mosque is from the apertures of dome chamber. In the present study, has surveyed the evolution of lighting from dome chambers. However, it is important to note that although the evolution process of domes, the science, and technique to achieve such geometry by Islamic architec-

tures is admirable, the most valuable concept lying in the long-term process of accessing to the knowledge of building is the "objective" of liking to the creator in the holy places as well as liking with light. It has also been assisted by expression and embodiment of the Creator. In his book, without raising the issue in vague aura, God has directly stated "God is the light of heavens and earth". Furthermore, the Islamic architecture whose source of art is Islam, the divine religion, has fulfilled this divine revelation by unity in maintain light in buildings, and has enjoyed the presence of God.

Table 3

Using the element of natural light in a mosque
Display of spiritual dimension in a mosque by some tools like light play, shadow, and decorations
Methods of showing feelings, sense of presence, motion, focus, ...
White light and the color made by it are a display of unity in diversity and dependence of diversity on unity
Transferred by blurs and lights without verbal communication and any direct relation and more concentration
Natural light has the properties of motion, being different, sequence and changes in moments naturally, which leads to motion and mode changes in different times

(Outlined by the author)

### 3-2. Dome chamber

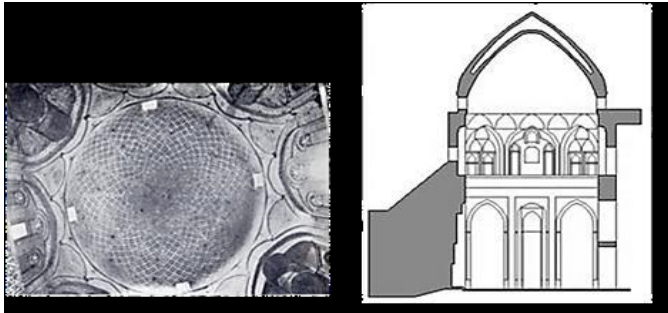

The most important part of theism house (mosque), like a stone sitting on a ring, is dome chamber and the real meaning of mosque has been borrowed from it. Dome chamber is placed in the main axis of mosque that is a monument-like structure, and is high (Gholamreza Kiani, p. 148). The dome is the secret of unity between the sky and earth in which the rectangular shape of structure corresponds with earth, and the circular dome aligns with sky. In the other term, Muslim architectures have imagined belonging to the soil with a square structure, which is a sign of endurance and stability belonging to the sky with a round, and circular dome, which is a sign of being drawn into divine thought (Muhammadi, 2015, p. 6). This simple building is independent and free. In the evolution of domes, besides considering technical principles and regulations regarding stability issues of the structure, the political and religious roots have also been important. For instance, in Safavid era, the plan and design of mosque dome is dodecagon that makes it different from other buildings in the Safavid period. Back then, one of the authority bases on Safavid that was founded on the basis of Twelver Shi'ism and considered the most important factor in religious and ideological issues of them heavily tried to advertise and promote it. At this time, number twelve that was a reminder of the twelve Imams of the Shia, and had a significant importance among Shiites was considered as the reference number. On this basis,



dome chamber that is the real theism house, and the most important Shiite Sufi house is founded based on number twelve. Moreover, where the polygon ends, the start of dome movement circle and reaching peak occurs (Gholamreza Kiani, p. 148, 152). For example, in Dome of the Taj-ul-Mulk (Khagy) in Jame Mosque of Isfahan, perhaps one of the most beautiful decorative effects of the building is a visual one, and the presence effect of the bricks in creating these effects. Producer of the building might have had knowledge in painting, music, and graphic in addition to architecture. Nowadays, our findings in this dome flourish some thoughts in minds that do not age more than one or few hundred years in the art history. Presence of visual elements such as script, surface, volume, color and pattern in this building is so strong and effective that its soft and pleasant coordination penetrates into soul of each viewer regardless of nationality, language and nation. The pleasant color of bricks in this building and type of the used decoration in it as well as light of different hours of day create such deep and different visual effects that are only visible in Khagi dome of Jame mosque of Isfahan (Tavusi, 2007, p. 33). In the architecture of Iranian mosque, light has never been applied unreasonably. In fact, incoming light in addition to physical dimension has been very effective in shaping the space in mosques, especially the spiritual dimension (Saadat, 2014, p. 9).

Table 4

*A sample of structures of four Iranian Islamic architecture styles, and the location of lightwells in domes of structures*

	<p>Khorasani style; Ardestān Jame mosque dome: the section and under dome facades (Memarian, 2006: 212)</p>
	<p>Razi style; dome of Taj al-Mulk Jame Mosque of Isfahan: the section and under dome facades (Hajighasemi, 2012.63)</p>

End of Table 4

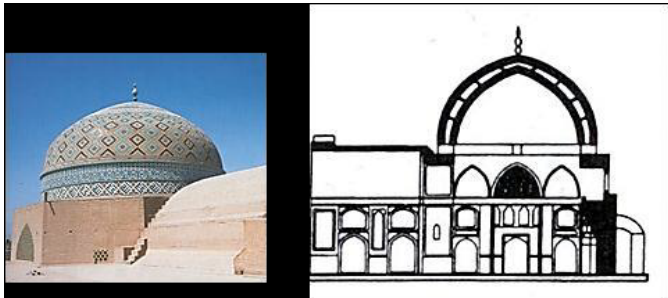
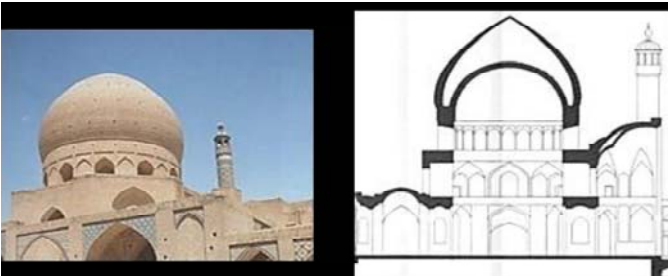
	<p>Azeri style, dome of Jame mosque in Yazd: section of Dome (Pir nia, 2006,234) and Façade (Hajighasemi, 2012.171).</p>
	<p>Isfahani style; Agha Bozorg School dome mosque. Kashan: the section and facades (Hajighasemi, 2012.153)</p>

Table 5

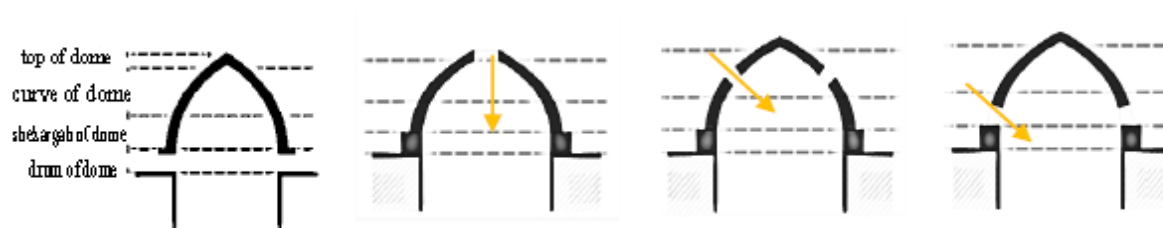
*Location and number of lightwells in four styles of Islamic architecture of Iran, Pirnia*

Name	Architecture style	Number of lightwells	Dome opening	Location of lightning
Ardestan mosque	Khorasanian	4	10 m	shekargah
Dome of Taj al-Mulk Jame Mosque of Isfahan	Razi	2	10.5 m	Shekargah of dome
Jame Mosque of Yazd	Azari	4	15 m	Drum of dome
Agha Bozorg mosque of Kashan	Isfahani	12	10.30 m	Drum of dome

### 3-2-2. Evolution process of lighting in dome chambers

Dome-shaped forms have always been considered as metaphysic and heavens powers in the viewer's idea, and the spherical shape of the sky and the planets has enhanced these images and references. Mechanical needs and symbolic values depend on the dome-shaped form have led the technical history of Iran in this regard to be very rich and fruitful. In order to achieve aesthetic goals and gain secrets of truth and divinity, Islamic architecture has constantly tried to remove the structural problems and obstacles of Dome, and create a hole for light to inter into space (Mahdavinejad, Mathur, p. 2). At the beginning of construction of the dome during

the Sassanid era and the early arrival of Islam in Iran, Only the lightwell in the middle of the dome was used to direct light into the place. However, with the advancement of dome construction techniques and a better understanding of how to distribute the forces and tensions in its structure, architects could somehow overcome this problem by creating the optimal forms and/ or certain construction methods, and they were able to use the body of dome for creating a hole (Nemat Gorgani, 2004, p. 35). In the courses of mosque architecture of Iran, we witness an upward trend of inward light, and it seems that the subject of light promoted from a quantitative process to a qualitative process in the late Qajar (Saadat, 2014, p. 5).



## Conclusion

The position of light in Islamic architecture is higher than visual values. Symbolic procedure and spiritual attention of Islamic artist to light places the image in the highest level of spiritual wayfaring. Light is the symbol of existence flow in the figure of levels. Settlement in the Muslim world paints each worldly and religious issue with the color of faith. Therefore, Islamic artist is dominated by the Supreme Islamic. Manifestation of light in Islamic art in Shamses and Mogharnas is all display of a scared matter, for which Iranian Islamic architecture is a meeting place.

## References

1. Khwaja Abdullah Ansari. Compiled by Imam Ahmad Meybodi, Literary and mystical interpretation of the Holy Koran: in 2 vol. Iqbal publisher, eleventh, 2006.
2. Naser Seyyed Hossein. Islamic art and spirituality, translation of Rahim Ghasemian. Tehran, Wisdom Publications, 2011.
3. Pir Nia, Mohammad Karim. The style of Iranian architecture, fourth edition. Tehran, Soroush Danesh, 2006.
4. Bolkhari, Hassan. The manifestation of light and color in Iranian art – Islam. Tehran, the Mehr Sureh, 2006.
5. Hekmat, Nasrallah, Mahboubbeh. Hajizadeh, light in the wisdom of Suhrawardi. Two-seasonal philosophical Journal of Shenakht, Research Bulletin of human Sciences, Spring and Summer 2013, no. 66.1, pp. 25—7.
6. Saadat, Davud. Analysis of the concept of transparency in the mosques of Iran. Theoretical roots and New Horizons in art and Architectural, 2014, pp. 1—12.

7. Bemanian, Mohammad Reza. Review of lightwells and light supply in the mosques of Tehran Qajar era. *Journal of Islamic architecture*, the third number, 2015, first year, pp. 60—74.
8. Madadpur, Mohammed. Light and its role in Islamic art. *Visual arts*, iss. 22, pp. 34\_3.
9. Gorgani, Mehraneh. Background of lighting in architecture and lighting fixtures in art of Islamic period of Iran. *Heritage*, no. 17, pp. 49—55.
10. Habib, Farah. Unison of light and color in Iranian city space. *Fine arts publication*, 2007, iss. 27, pp. 34—27.
11. Mirmiran, Hadi. A journey from material to spirit. *Journal of urban construction and architecture*, 1999, no. 42—43.
12. Nemat Gorgani, Om al-banin. The background of light in the architecture and lighting fixtures in Islamic art, *Asar magazine*, 2004, iss. 35.
13. Memarian, GH. Stagnation of vaulted structures in Islamic architecture; the first volume. Tehran, Jihad publishing, University of Science and Technology, 1945.
14. Mahdavinejad, Mohammed, Mathur, Saha. Quality of lightwells in the Persian dome. *The Naghshe Jahan*, iss. 3, pp. 1—12.
15. Hajjghasemi, Kambiz. A cultural treasure of Islamic monuments, mosques. Tehran, Shahid Beheshti University, University Press, 1979, Book VI.
16. Noorbakhsh, Sima. Light in the wisdom of Suhrawardi, Second Edition. Tehran, Saeed mohebi press, 2005.
17. Tawusi, Mahmoud, Azadi, Fariba. The Alchemy of bricks and Khagy dome role in the Jame mosque of Isfahan mosque. *Art teacher Journal*, 2006, no. 1, vol. 1, pp. 29—44.
18. Madadpur M. The manifestations of spiritual wisdom in Islamic art. The third edition of Tehran International Publication, 2011.
19. Abbasi, Manijeh, Nowshadi, Zohreh. The concept of light in aesthetic aspect in Iranian traditional architecture. *Proceedings Conference on Islamic-Iranian architecture and urban planning*. Mashhad, 2012.
20. Rahbarnia, Zahra, Roozbehani, Roya. The manifestation of God's light with the mystical and artistic aspects in Islamic Iranian architecture with an emphasis on Sohrvardi's idea. *Nghshe Jahan*, 2014, fourth year, no. 1.
21. Memarian, GHolam Hussein. A process in the theoretical foundations of architecture. Tehran, Soroush Danesh, 2005.
22. Mais, Pier Phoun. Translation of Simon Aivazian, a look at the fundamentals of architecture. Tehran, Tehran university press, 2005.
23. Bemanian, Muhammad Reza. Approaches in explaining Muslim architecture, Tehran, municipal and village administrations, 2006.
24. Nezhat B. A symbol of light in Sufi literature, *Spiritual Studies*, 2009.
25. Kiani, Gholam Reza. From the monastery to school, work 29 and 30, pp. 146—158.
26. Mohammad, Ali Reza. The first National Conference on Science. Engineering, new ideas, higher education institutions of Ayandegan, 2014, may, 11, pp. 1—10.
27. Mahdavinejad M. J & Mtoor M. H. Recognition of light openings in Iranian mosques' domes. *Journal of Architectural Engineering & urban planning*, 2011.
28. Ashkan M. & Ahmad. Persian Domes: History, Morphology and Typologies. *Archnet-IJAR*, 2009, vol. 3, iss. 3, pp. 98—115.