

Sundial, Solar calendar: Tools for building an astronomical city

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Introduction

Čahār-Tāqīes is one of the basic forms in Iranian architecture, which is used in many buildings from the Sassanid era to the Islamic period. It is repeated and seen. In the case of Sassanid era Čahār-Tāqīes, the question is often raised whether this Were the buildings a temple or a part of the fire temple and had a religious function or did they have other uses? Lack of methodical information in this regard, restoration measures, archeological excavations and site organization It affects the historical building in a negative way. In this research, in addition to religious usage, to Other uses that can be imagined for Sassanid Čahār-Tāqīes are discussed; Applications such as Being a sign of a guide, a sign of a grave, or like a solar structure, a calendrical use. to have.

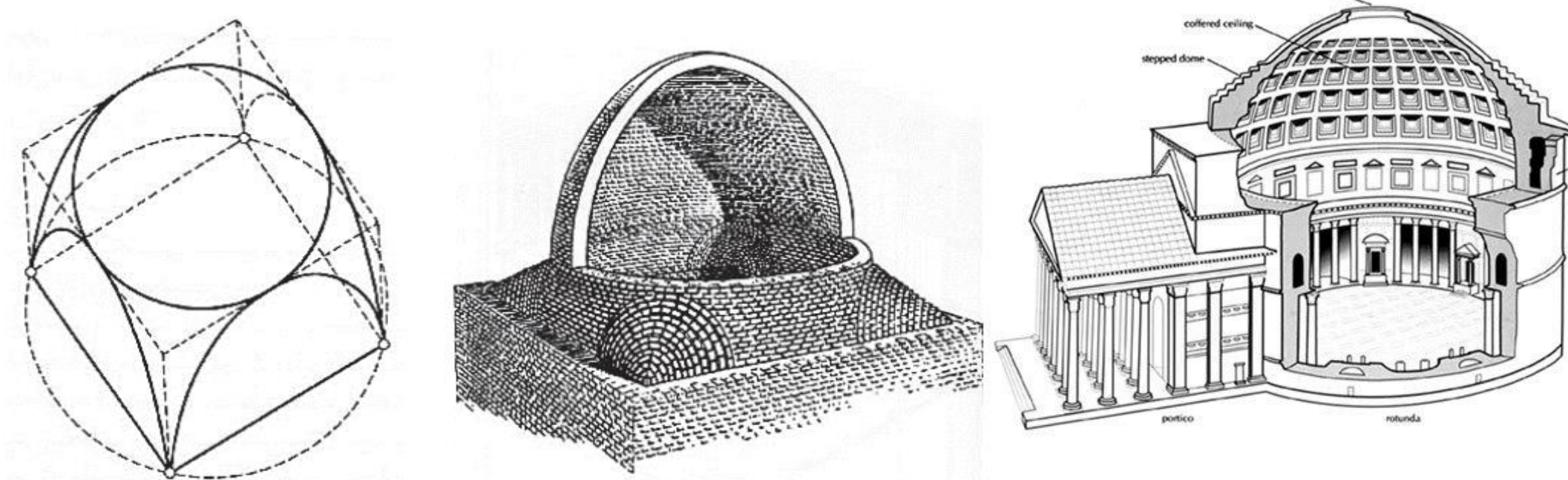


Figure1. The image of the dome covering the cube-shaped space

Figure2. Pantheon Temple- Dome on a cylinder

The structural pattern of Čahār-Tāqīes :

If the dome is placed on a cylindrical space, it can be integrated with the body of the building . An example of this kind of dome can be seen in the Roman Pantheon(Figure2) .But in dome construction on the cubic space, the main problem is how to convert the cubic space below into the circle of the dome. In Iran's pre-Islamic architecture, filpoosh and seh-konj are used to convert a square into a circle dome.(Figure1)

Classification of Čahār-Tāqīes

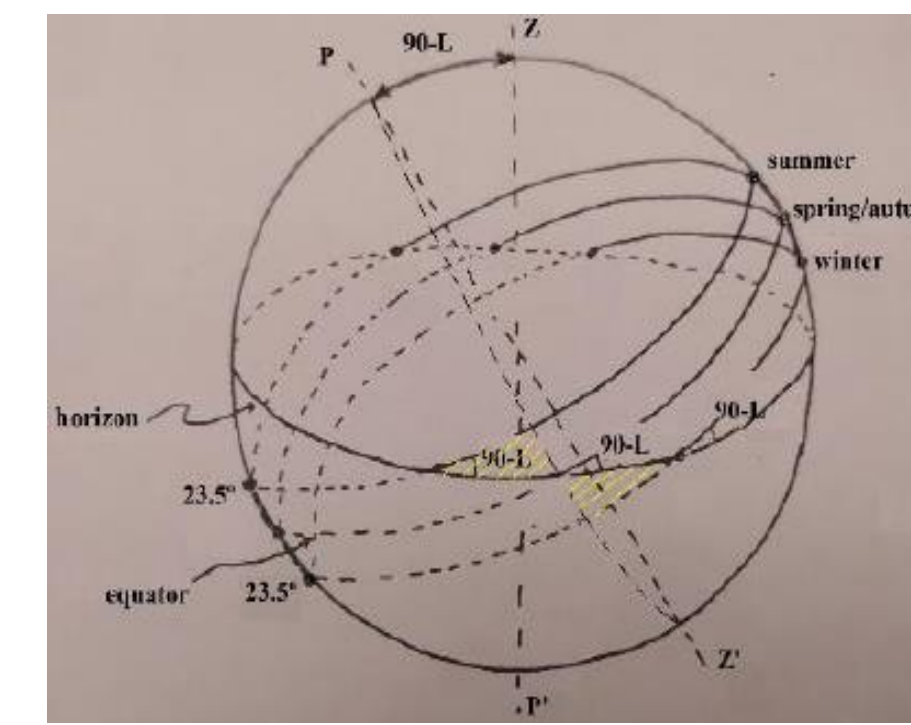
There are three functional models (prayer, emblems and observatory) about the Čahār-Tāqīes, which are:
 A) Prayer: fire temple, protection of the holy fire (temporary fire temple for performing the final ritual of prayer - open fire temples for public fire display)
 B) Signs: signs on the road that are built on the highways and are visible.
 C) Observatories: astronomical building, solar observatory to recognize the days of the year and to determine the exact day of the final prayer.
 In this research, we have examined the calendar use of the Čahār-Tāqīes and then we analyze this structure by drawing the plan and checking the sunrise and sunset angles.



Figure3. Čahār-Tāqīes of Jareh - Baladeh - Kazeroun city - Fars province – Iran Location: 29.297224457236133N , 51.96010402003014E

Review and compare

By examining the geographical location of Jareh-Baladeh Char-Tagi in Kazerun city (Fars province), we find that the sunrise and sunset interval is not 23.5 degrees and this interval reaches about 30 degrees. For a better understanding of this issue, we can take the Nebra tablet as an example. The two arches on the edge of the disk (one missing) seem to indicate the arc described by the Sun on the Eastern horizon from the Summer and Winter solstices rises: 82° In the pictures, we have shown the relationship between latitude and sunrise time.



Latitude L	X°
0°	23,5°
10°	24°
20°	25°
30°	27°
40°	32°
50°	40°
60°	53°

Figure4. The relationship between latitude and the range of the sun's deviation from the local horizon



Figure5. Nebra tablet - 80 degree angle shows that this tablet was found in latitudes above 40 degrees.

Conclusion

By combining the science of architectural engineering and astronomy, we were able to find out that by drawing the plan of a historical work and astronomical studies, according to the sunrise and sunset on the important days of the year (solstices and equinoxes), a calendar usage for this building can be determined. The fact that our ancestors paid a lot of attention to the rising and setting of the moon, stars and the sun and they used this issue in the construction of temples, places of prayer and strategic military centers.

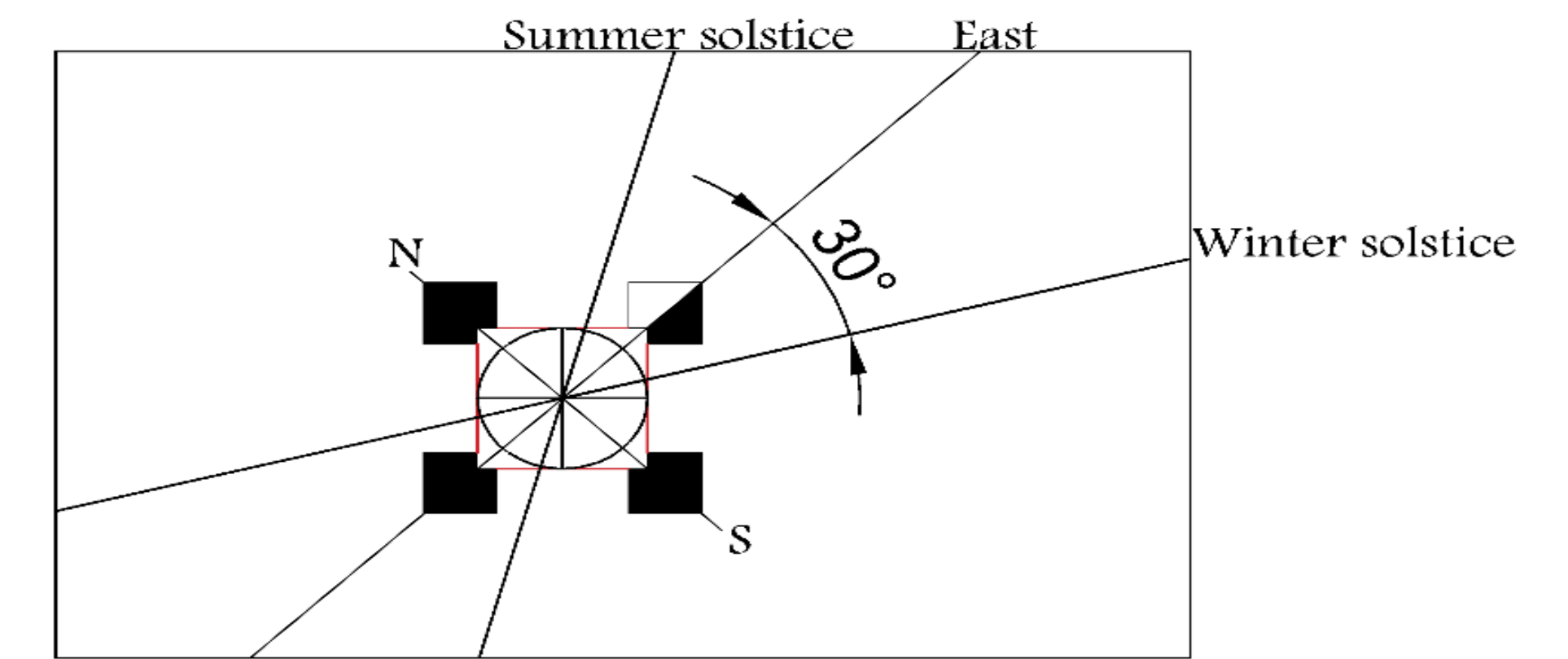


Figure6. Plan Čahār-Tāqīes of Jareh - Baladeh - Kazeroun city

Contact us

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