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To cite this article: Galyna Shevtsova *et al* 2020 *IOP Conf. Ser.: Mater. Sci. Eng.* **960** 022105

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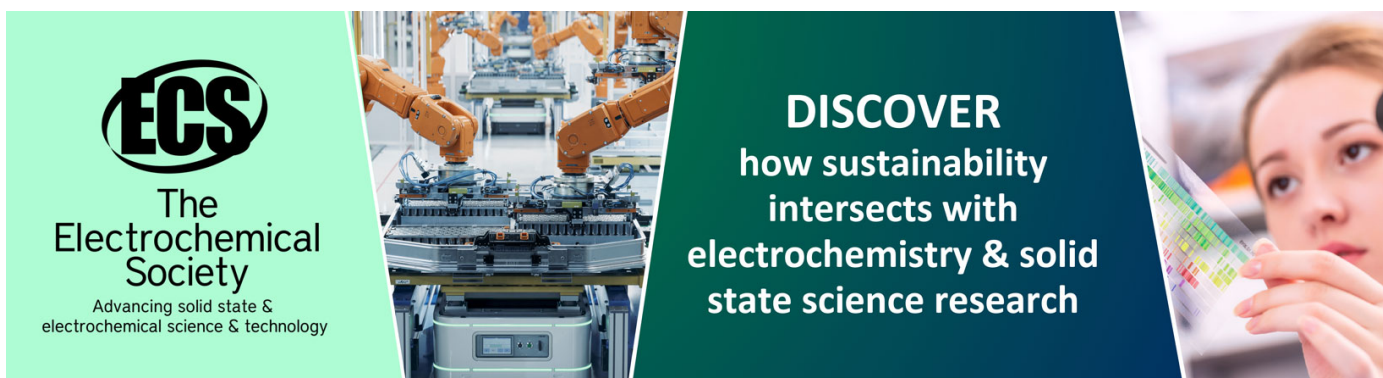
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The Architecture of the Cathedral of Saint Sophia in Kyiv: Uniqueness and Universality in Historical Cultural Spaces

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Abstract. The Cathedral of Saint Sophia in Kyiv (from the beginning of 11th c.) is the largest, most complicated, most monumental architectural object that cross-links the Ukrainian architecture stylistic experience of all times. The purpose of the study is to identify the contemporary understanding and the multifaceted cultural content of this monument, which combines the logic of thinking of medieval Byzantium and the traditions of local pagan constructions, as well as European Baroque fashion in its regional variability. The square outside the cathedral was invariably fundamental to state-building cultural events, but its context also varied in each era according to urban fashion. Uniqueness and universality are combined in this building, creating endless space to reveal its cultural content. The new interpretation of this content in every scientific generation enriches and broadens the understanding of this object itself as well as hidden inside of it the genesis of the monumental architecture style-formation phenomenon's in its historical and contemporary dimension. The publication demonstrates an up-to-date interpretation of the understanding of the content and form of Saint Sophia Cathedral. This is, in some meaning, a demonstration of the current state of development of Ukrainian fundamental science, which cannot have definitive answers to "eternal" questions, but aims to approach scientific truth through permanent refinements of knowledge. The article defines the planning, constructive, three-dimensional compositional, artistic-aesthetic and figurative characteristics of Sophia Kyiv's architecture. There is also developed an innovative analysis of the genesis and sacral sense of Cathedral's architecture based on the author's original definition of archetypal (basic, initial) semantic models of world temples formed in different geographical and religious contexts. Cultural mutual influences and historical changes in the architecture of the monument are also noted. In the field of historical building experience, the acoustic features of Saint Sophia Cathedral are noted, which remain relevant in the modern design of temples. In conclusion, it is resulted that the Cathedral of Sophia in Kyiv is an outstanding example of combining the continental traditions of sacral construction of the Pre-Class Age with the context of the achievements of the monumental experience of Christian antique and Byzantine architecture. Sophia Cathedral, as the most monumental ideological achievement of the Kyivan Rus' state, reflects the merger of these two lines, two traditions. That is why this monument is of utmost importance for deepening understanding of the evolution of Ukrainian and world architecture. In addition, the Cathedral of Saint Sophia in Kyiv became the basis for further historical forms of Ukrainian Orthodox temple construction – both folk (wooden multi-tower churches) and stylistic professional monumental architecture (Ukrainian temples of the Renaissance and Baroque, Art Nouveau).



Therefore, we consider that the Sophia's Cathedral in Kyiv is a key object for the scientific study of the development of Ukrainian architecture.

1. Introduction

St. Sophia Cathedral in Kyiv is a monument of Ukrainian architecture built in the beginning of 11th c. The cathedral is a unique phenomenon of world architecture, the grandest and most elaborated embodiment of this type of building: no other temple has 13 domed towers over the cross-in-square system. The cathedral is the urban centre of the capital of Ukraine, preserving for thousand years the function of the compositional-urban and ideological-states dominant. During the time, the cathedral had some renovations but preserved its autochthonous features that allowed it to be registered as a UNESCO World Heritage Site (1990). The cathedral was built as one of the first monumental structures in the centre of the newly built capital of Kyivan Rus, as a programmatic architectural work that testified the imperial ambitions of Slavic Empire (near the Byzantine Empire and the German Empire of Ottomes) in the zenith of its power centralization corresponding with economic opportunities and cultural aspirations. Nothing biggest in Rus was built either before or after. The cathedral was a part of ensemble of the palace structures of the Grand Prince and had a connection with the urban space (apparently following the structure of the imperial centre of Constantinople, where square Augustaion united the Cathedral of Sophia of Constantinople and the imperial palace with the city avenues). Like the main cathedral of Byzantium, the main cathedral of Kyiv received the dedication of Sophia-Wisdom of God and was to be an architectural model of the medieval Christian world-structure image – with its centricity, hierarchy, sphericity, balance of wisdom and collegiality, world's integrity in its spirituality and materiality, including the political and architectural-tectonic aspects.

In all world cultures, there are programmatic objects that identify, materialize the spiritual priorities of the generation, the people, and the state. Mainly the world experience of architecture demonstrates the awareness of the event of such construction, the act of designing a monumental sacral structure. Monumental architectural structure as a manifestation of overcoming material physical laws (gravity of the earth and temporal destruction) – such objects include the Luxor Temple, Parthenon, Pantheon, Angkor Wat, St. Peter's Cathedral, Zvartnots, Notre-Dame de Paris and many others [1]. Their significance in the cultural world takes on super-material forms; they are not only monuments of construction achievements, but some independent cultural phenomena. In such case, the content of a particular culture is so perfectly articulated with architecture that the very name of the cathedral becomes a subject of Husserl's phenomenology, a supernatural and timeless essence, synonymous of the culture that created it. The discovery of such cultural content regarding the architecture of the St. Sophia Cathedral of God-Wisdom in Kyiv is a current task of the fundamental architectural science, which receives in each new generation of scientists its additions, finding and opening of new contents, a new interpretation of architectural forms [2].

2. Volume-spatial structure of St. Sophia in Kyiv Cathedral

St. Sophia Cathedral from the time of construction in 11th c. preserves its volume-spatial structure: it is a 5-naved 20-partial 12-pillar 5-apse 13 domed cross-in-square temple, surrounded on three sides with two-tiered interior gallery (narthex, aisles) and exonarthex with two symmetrical towers with stairs leading to the choir. The lateral facades had symmetrical open galleries (figure 1). The volume-spatial structure clearly expresses the compositional, symbolic and constructive sense of the crossed-dome system. The main dome-square-bay (a volume of main dome with pendentives supported with four piers) and cross arms (main nave and transept covered with barrel vaults) are dimensionally accented. All lateral naves are equal in size; twice as narrow as the main one, all parameters of the spatial components of the plan have proportional mutual consistency [3]. The spherical main dome with pendentives creates down and outward weight pressure. This pressure is transmitted to: 1 – a system of dome arches with pendentives and then to the four dome piers, 2 – adjacent to these arches

tectonically accented on facades barrel vaults of the main nave and transept, 3 – a system of additional domes, placed diagonally to the main dome-square-bay. Therefore, the main dome is complemented with the system of additional domes: all diagonal peripheral square bays (cells of side naves) are covered with domes with pendentives. In this case, adjacent to the main dome, four diagonal smaller domes rest upon turret drums that functionally provide lighting, and constructively dampen the outward thrusts of the main dome. In turn, these four diagonal domes are surrounded with lower domes: in the altar part near each diagonal dome is placed one lower dome, in the entrance part – around each of the diagonal domes, three lower domes are placed.

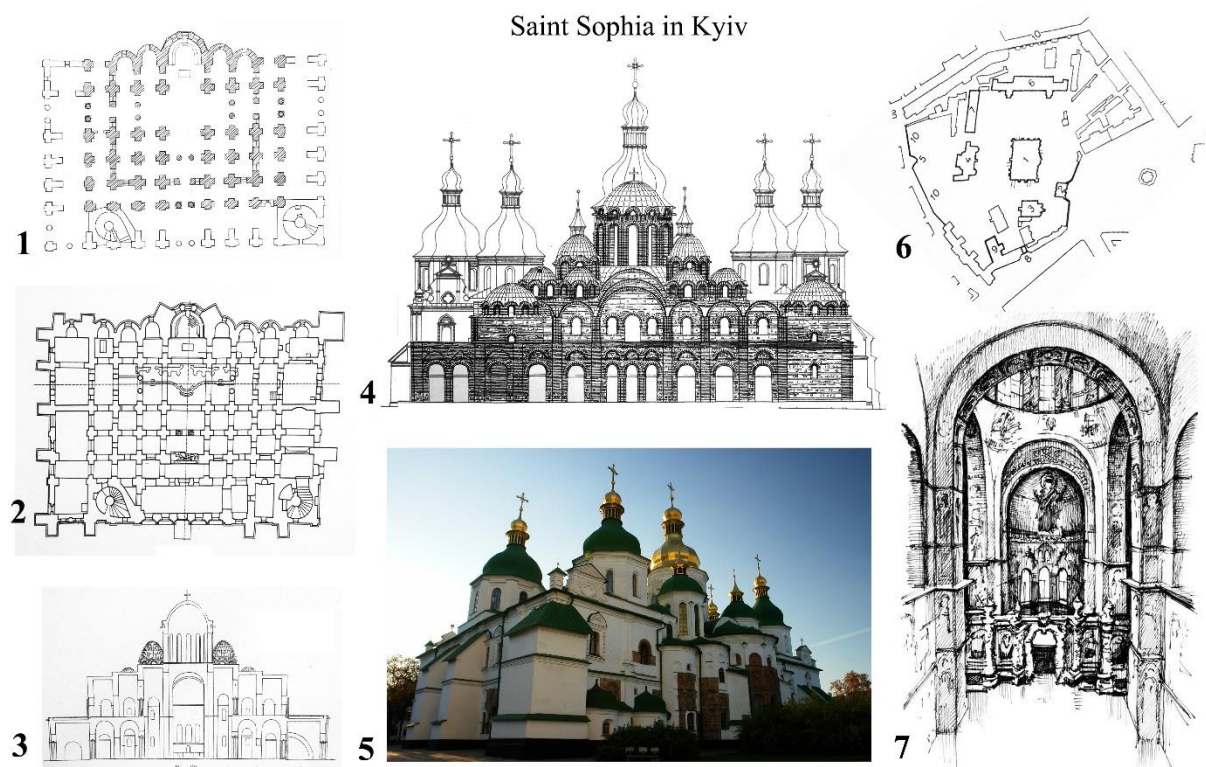


Figure 1. St. Sophia Cathedral in Kiev

1 – Floor plan of 11th c. (reconstruction by M. Kresalniy, Y. Aseev, V. Volkov). 2 – Current floor plan. 3 – Main transept section of 11th c. (reconstruction by M. Kresalniy, Y. Aseev, V. Volkov). 4 – Current western front elevation combined with the same of 11th c. (reconstruction by M. Kresalniy, Y. Aseev, V. Volkov). 5 – Eastern face of the Cathedral (photo by G. Shevtsova). 6 – Current layout of the St. Sophia ensemble (formed in 17th-18th c.). 7 – Interior view (drawing by N. Mezhenina)

In the volume-spatial structure of the cathedral (both in the interior and in the exterior), there is a very clearly visible hierarchy of spaces and volumes: the main dome is surrounded with four symmetric lower diagonally domes that are supported with eight symmetric lowest additional domes. The barrel vaults of the main nave and the transept are visible in the exterior; the overlapping of the choir is of similar form but twice narrower and slightly lower (see figure 1). Such a structural system is the largest of the cross-in-square multi-dome structures created in the history of world architecture. The resulting composition has absolutely elaborated system and distinct formal hierarchy [4]: grouping of proportional elements by a centrally diagonal pyramidal scheme is a manifestation of the theological Christian idea of the comprehensiveness of the emanation of the world from the Absolute Divine Centre. The composition of the cathedral symbolizes a tiered hierarchical universe: as they

move away from the centre (the main dome), the forms become smaller and smaller (gain the earthliness), their number increases, and finally, the accented verticality of the main dome-square-bay is replaced by horizontal low architectural masses. The symbolism of the number of elements has Christian theological interpretations: 13 domes interpreted like the presence of 12 apostles and Christ, etc. Note that in pre-Baroque time, all interior spatial divisions was free of décor being clearly visible in the exterior. The cathedral as a model of ideological paradigm did not require additional means of expressiveness: externally Byzantine mixed stripy masonry made of bricks and stones on mortar had no details. The very shape of the building was an ornament, to use O. Spengler's words, about such significant architectural objects [5]. Instead, the interior corresponding with traditions of the Byzantine architectural and liturgical canon was decorated with a system of hierarchical images. In the Cathedral of Sophia in Kyiv, there are frescoes and mosaic sacral images, framed ornaments and scenes of secular content on stairs, choirs, and galleries. In addition to the liturgical ceremonies, the cathedral performed state functions and contained a library. Lighting was provided window openings in the dome drums and exterior walls – small, narrow, creating an artistic atmosphere, directing streams of light snatching elements of paintings and provoke glares of mosaics. The acoustic requirements were provided by a system of special means. The sound spreads from the altar part due to the reflection from the hemispherical overlap of the apses; the echo dampens in the dome drums; the sound reverberation was dampened in the texture of architectural surfaces and with special of so-called “golosnik” (embedded in the thickness of the walls and pendentives hollow jugs). Therefore, for the time of the 11th century St. Sophia Cathedral was an extremely technological, progressive and monumental construction.

3. The iniquity of St. Sophia in Kyiv Cathedral's structure

During the construction of Kyiv's St. Sophia Cathedral in the early 11th century, architecture of crossed-dome temples had several regional schools (Constantinople, Greece, Caucasus and so). If we bring to the unified scale the main temples of the Eastern Christian world of 11 c., St. Sophia in Kyiv surpasses the accomplishments of Constantinople and the provinces (figure 2). In the capital of Byzantium (Constantinople) and in Greece (Thessaloniki, Athens) monumental temples were not built in this time, just small single-domed four-pier churches were erected. Instead, large-scale basilicas were constructed in Asia Minor and the Caucasus (Armenia – Ani, Georgia – Mtskheta, Kutaisi). St. Sophia in Kyiv shows some analogies in size and ideological significance with the crossed-dome basilicas of Georgia [6] where the same as at Kyiv Rus, the young state manifested itself by the monumental temples of original style, experimental construction and composition (see figure 2). It should be emphasized that the way to resolve the problem of main dome's outward thrusts by diagonal placing of peripheral domes on high drums as it was in Kyiv's Cathedral, has no synchronous analogues in Byzantine architecture. There are no such decisions in the temples of Constantinople in the beginning of 11th century; the only incomplete analogy can be considered the Panagia Chalkeon church of the Greek Balkan Thessaloniki dating from the first half of the 11th century. The temple has two diagonal domes on high drums, but they do not directly adjacent to the main dome. In Constantinople, the layout of the peripheral domes became known only in the second half of the 11th century (Church-Mosque of Vefa also known as Molla Gürani, where domes are placed above the narthex and do not have direct connection to the main dome). In other well-known early crossed-dome schemes (fixed from the 6th century), the diagonal spatial bays around the dome piers are overlapped by vaults (in one or two tiers) and have no external expression. The exceptions where diagonal domes could be present are hypothetical reconstructions of several temples of 6th-7th centuries. There are Sophia's Basilica of Nicaea, Temple outside the walls of Al-Rusafa (Syria), Sophia's Cathedral in Thessaloniki [7]. We may suppose some connections of the Sofia in Kiev's builders with Thessaloniki, but the hypothesis about the implementation of local autochthonous folk traditions in the construction of Kyiv St. Sophia Cathedral is more appropriate.

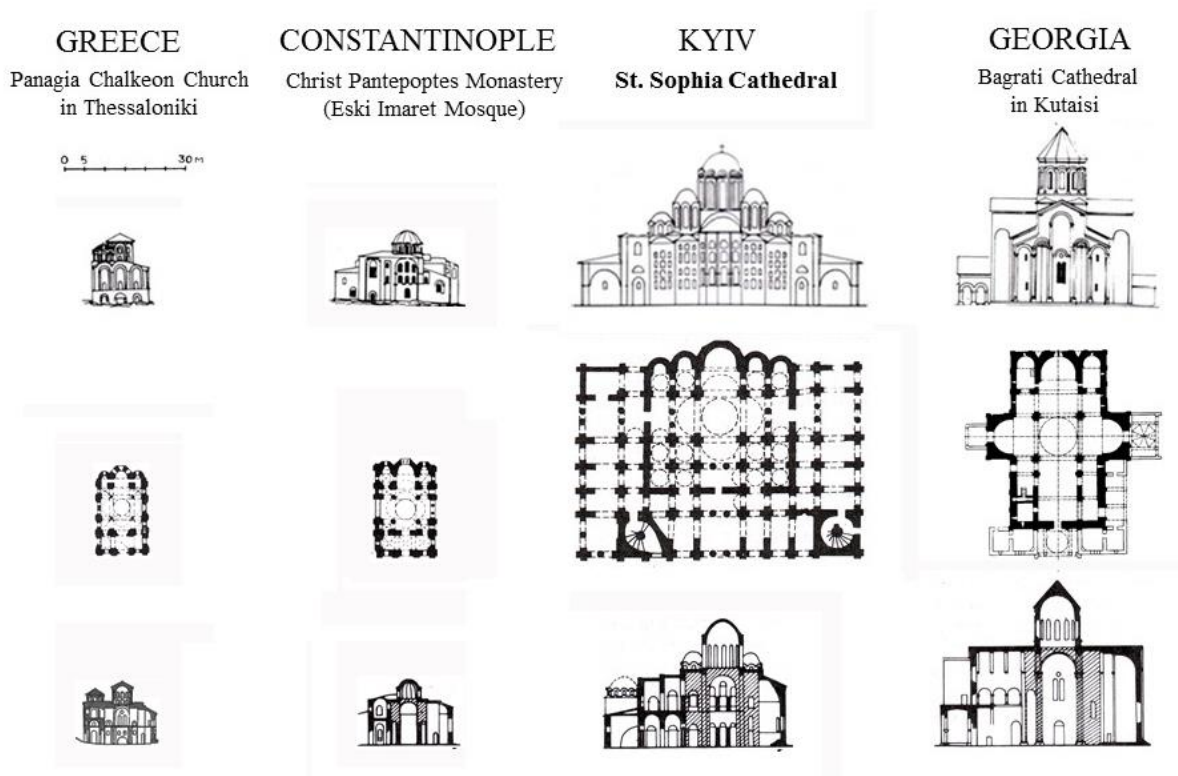


Figure 2. Comparison of Eastern Christianity monumental crossed-dome temples built in the first half of 11th c. Plans, longitudinal sections, eastern (St. Sophia in Kyiv, Bagrati) and southern elevations (Panagia Chalkeon, Christ Pantepoptes, drawings by N. Logvyn). All drawings are brought to the unified scale.

4. Pre-Christian influences in St. Sophia Cathedral in Kyiv's architecture

It is interesting to compare the volume-spatial composition of Sophia in Kyiv with the main archetypal compositions of sacral buildings of the world that we have identified in our previous writings [8]. They are closely related to the semantics of the primary religions and, accordingly, localizing in the areas of historical influence of these religions (figure 3). In general, there are three principal archetypes of the volume-spatial composition of temples in the world. Antique one, is based on the idea of depth space development. Later this tendency was continued, with a change of emphasis on interior, by compositions of Western Christianity basilicas. Central-Asian Zoroastrian archetype developed integral centric-elevated compositions, and then with certain influences of Antique structures, was adopted in the architecture of Eastern Christianity (Byzantium-Caucasus region [9]). South-East Asian Polytheistic archetypal composition develops combined jointed only at ground level, pyramidal structures with several tiered towers that have tectonic reflection in the interior of the temple. This composition was then continued in Hindu, Buddhist and syncretic Hindu-Buddhist tradition of India and Indo-China region. If we place the cathedral of St. Sophia into this scheme (see figure 3), it is easy to notice that its volume-spatial composition is a synthesis of the two temple archetypes: Central-Asian Zoroastrian (later transferred into Eastern Christian) and South-East Asian Polytheistic (later transferred into syncretic Hindu-Buddhist).

As noted above, the pyramidal stepped multi-dome composition of St. Sophia Cathedral is innovative, uncharacteristic of both Byzantine and Caucasian patterns of Eastern Christian architecture, however, this compositional feature clearly demonstrates its kinship to South-East Asian

archetypal compositions. The tiered structure and vertically pyramidal composition of the temples of South-East Asia stems from humanity's basic animistic view of the temple as the staircase for the deity that unites heaven and earth. After all, the traditions of installing vertical idols in the centre of the Slavic round open-air sanctuary come from the same idea. The multi-tower combinatory central hierarchic of Hindu temples' composition, in turn, is linked to the polytheistic traditions of devoting towers to different deities, and thus combining several shrines in the architecture of one temple. In Buddhism, this idea was further developed: central tower could be dedicated to Buddha and the others to local deities [10], or all towers could embody different stages in the life of Buddha [11] (compare to the noted above semantics of the 13 domes of the Cathedral of St. Sophia, that is usually associated with Christ and the 12 apostles).

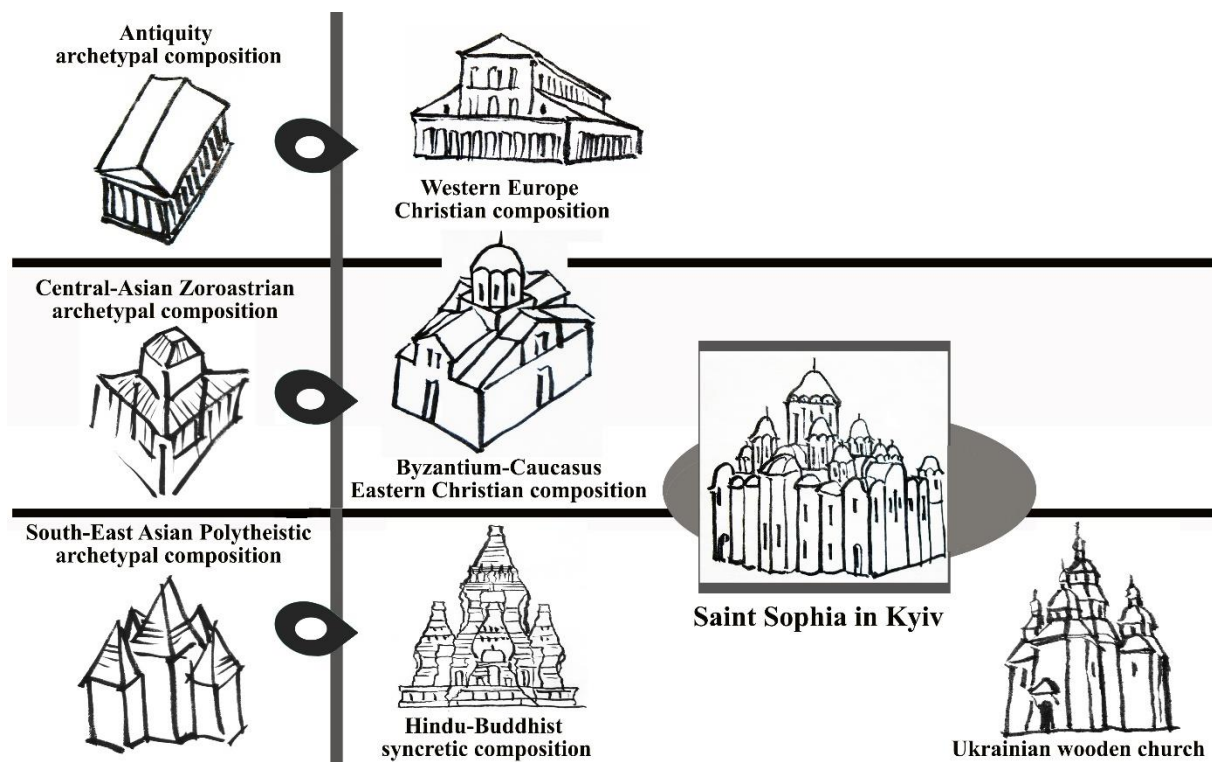


Figure 3. Main compositional archetypes of world sacral architecture. The place of St. Sophia in Kiev (drawings by G. Shevtsova)

It is interesting that Hindu architecture shows a close connection with wooden construction [12], which makes it possible to draw a parallel with the wooden architecture of pre-Christian Rus, whose traditions obviously significantly influenced the compositional decision of the Cathedral of Sophia in Kyiv and, accordingly, all subsequent Ancient Rus temples. Traditions of a square layout wooden log-structure covered with a pyramidal roof, from pre-Christian times formed the basis of the residential, defensive and sacral architecture of Rus. Ancient Rus structures are characterized with high-altitude opening of the interior space, pyramidal silhouettes of defensive towers, porches, deep eave galleries around the buildings. All these traditions of folk wooden architecture were transferred into the architecture of the stone Christian temples of Kyivan Rus. The same ideas are also reflected in the composition of the Ukrainian wooden church of 16-18th c. (see figure 3), which is built on the basis of a composite pyramidal combination of independent stepped log towers, fused only at the ground level and tectonically expressed in the interior. In this point, it is almost identical to the South-East Asian

Polytheistic archetypal composition and could be possible understood like a specific compositional feature sourcing from the polytheistic semantic common for all pre-historic humanity cultures [13].

5. St. Sophia Cathedral in Kyiv through the centuries

The history of St. Sophia Cathedral in Kyiv is synonymous with the history of Ukraine. After the Mongol invasion and the destruction of the state, during the Lithuanian and Polish rule, St. Sophia Cathedral, with certain destructions and reconstructions, remained the dominant in the Upper City of the Old Kyiv Plateau. Engravings of Lithuanian and Polish prints of the end of the 16th-17th centuries show the cathedral view on panoramic images of Kiev, mapping schemes, illustrations. The cathedral during this period belonged to the Uniate church. The extraordinary exaltation of Ukrainian architecture with significant construction activities began in 17th century, while national statehood restoration. As in whole Europe, medieval temples in Ukraine underwent a reconstruction adopting the features of a current European Baroque style. In Ukraine, the Cossacks and monasteries leaders care about creating a new monumental stylistic architecture. It is worth to mention the dualism of the Baroque style of Ukrainian sacral architecture [14]: the creation of experimentally distinctive Orthodox temples continuing the traditions of Kyiv's St. Sophia Cathedral with the slight Baroque influence from one hand and the citation of architectural patterns of European religious orders in Catholic churches from the other hand. Thus, innovative interpretation of autochthonous compositional traditions merging into original symbiosis with the systems of European styles are noticeable in Orthodox architecture of Ukraine [15], while local Catholic architecture had provincial, colonial features [16].

St. Sophia restored the cathedral status in 1633; the Metropolitans of Kiev Peter Mohyla and Varlaam Yasynsky during the 17th c. build an ensemble around the cathedral in the traditions of Orthodox monastic architecture (asymmetry of the layout, separated island-like position of the cathedral, chamber housing (cells) along the monastery fence, see figure 1). The cathedral was renovated with the help of Hetman Ivan Mazepa: the ensemble was complemented with a distinctive tiered bell tower; the domes of the cathedral got a new Baroque pear-like shape and the facades – a stucco layer with Baroque ornamentation. Representative buildings were added to the layout, the territory was surrounded with a monastery fence and sumptuous gates, etc. [17]. Since the late 18th century Ukrainian culture was oppressed, the Cathedral was deprived of status, the monastery was dissolved. Around the cathedral was formed a new front city-building area with stylistic features of historical stylization [18]. The buildings of the second half of 19th – first half of 20th c. now create the environment of the monastery ensemble at St. Sophia Cathedral. Cultural and historical content of the majestic multi-domed cathedral determined the square near as the site of all significant events of state formation of the Ukrainian nation during the 20th century. St. Sophia Square could be considered a semantic analogue of the Romano Forum in Rome for Ukrainians.

6. Results and discussions

The cathedral in Kyiv was built half a millennium after the eponymous Constantinople's cathedral. Therefore, in Kyiv it was created not an analogue of Sophia of Constantinople, but the most brilliant of the possible variants of the current crossed-dome temple, the completion of constructive modelling of the crossed-dome system. Such innovation become possible due to harmonic combination in the architecture of the Sophia Cathedral in Kyiv of the monumental style traditions of Eastern Christianity architecture with the folk pre-Christian constructional and compositional traditions of autochthons. The cathedral preserves the traces of local wooden structure composition. It consists of covered with domes volume-spatial bays – a kind of stone interpretation of combined wooden log-towers. The frame-bearing elements of the St. Sophia Cathedral create the spatial unity and high-altitude opening of the interior, the centric vertical dynamics and pyramidal, multi-dome, polyphonic composition that is close to its semantics to prehistoric polytheistic compositional archetype. St. Sophia in Kyiv surpassed the similar searches of Greek, Balkan, Minor-Asian and Caucasian architectural traditions

and elaborated the pattern for the further development of Ancient Rus and then Ukrainian architecture. All the temples of Kyivan Rus inherit the essence of composition and constructive structure of St. Sophia in Kyiv, just interpreting it in smaller scale (a smaller quantity of naves, structural bays, and domes) but always revealing more clearly architectural logic of the cross-in-square system comparing with Byzantine constructions. St. Sophia Cathedrals of Novgorod the Great and Polotsk, the Assumption Cathedral of Kyiv Pechersk Lavra, the cathedral of St. Michael's Golden-Domed Monastery, St. Michael Church of Vydubychi Monastery, St. Cyril's Monastery and the Church of the Saviour at Berestovo in Kiev etc., are the replicas of the architectural scheme embodied in the Kyiv's Sophia Cathedral. Due to this embodiment, the five-headed (having five tall dome-on-drum towers) cross-in-square church with a diagonal placement of four symmetrical small domes around the main one became a traditional for Ancient Rus architecture. Further Ukrainian architecture also closely links to the historical tradition of St. Sophia Cathedral in Kiev. In each of the historical style epochs in Ukraine were built Orthodox multi-towered temples of similar composite pyramidal structure with 3-5 symmetrical tall domed towers (for example, the St. George Cathedral of the Vydubychi Monastery, the Church of All Saints over the Economic Gate in Kiev Pechersk Lavra and so). In wooden folk architecture, the closest replica of St. Sophia Cathedral is Holly Trinity Cathedral in Novomoskovsk, where common for Ukrainian log church's combinatory five-tower composition with four symmetrical smaller towers placed on the axes of the main tower was complemented with four additional diagonal towers creating nine-tower structure. The same as at St. Sophia, all nine towers of Holly Trinity Cathedral are tectonically expressed in the interior.

7. Conclusions

The St. Sophia Cathedral in Kiev is a thousand years old object of world cultural heritage that embodies the integrity of national history. The cathedral is a real centre for self-identification of Ukraine, forming an important cultural space and being the heart unifying Ukrainians of all times, generations and destinies. Its architecture preserves the main principles of traditional Ukrainian architecture (pre-Christian and wooden folk as well), combining them with the forms of pan-European historical architectural styles (Byzantine, Baroque). St. Sophia Cathedral in Kiev is a universal and unique structure that is original and at the same time contextual to the global history of architecture as well. It is the creative accomplishment of national culture continuing and developing the mental heritage of all humanity.

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