ARCHDESIGN '19 CONFERENCE PROCEEDINGS

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VI. INTERNATIONAL ARCHITECTURAL DESIGN CONFERENCE

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The aestheticization of Yugoslav architecture through structuralist analysis of formmeaning relationship

This paper addresses the aestheticization of Yugoslav architecture through the implementation of structuralist form that took place between the early 1950s and the late 1970s, and calls attention to the need for contemplating the relationship between formal and intrinsic elements in architecture. An important component of the interest for the formal issues of architecture was to make a distance from functionalistic philosophy, which led to novel understanding of form and to the aestheticization of architecture. Structuralist aesthetics, which was accepted in the 1950s, changed the concept of form for the concept of structure, and focused on the elucidation of internal construction and organization. With reference to structuralist theoreticmethodological approach, an aspiration of Yugoslav architects for achieving inter-relationship between physical and semiotic structure via invisible laws that define and form elements of structure is pointed out. Different aspects of aesthetics of Yugoslav architecture reflected in various approaches for accepting the formal principles: the recognition of constructive aesthetics and importance of integration of constructive and formal elements of an organic entity, the interest for relations between the elements of architectural system, the idea of fluid space, and the evolutionary growth, development and transformation. This paper starts from the premise that the aspiration for aestheticization of architectural form through articulation of the unity of elements promoted Yugoslav architecture to build a connection between formal structure of an object and the meaning of its structural elements.

Introduction

The theme of aestheticization emerged in Yugoslav architecture in mid-1950s through the critics of functionalism, which questioned the value of function over aesthetic form. In the early 1950s, a tendency to oppose moderinstic functionalism and to promote a more formal and semiotic approach in architectural theory and practice, promoting. Structuralistic concepts spread all over the world under the influence of Aldo van Eyck and Team X, which rejected functionalism doctrine in urbanism. Structuralism represents the most important avant-garde movement in the 1950s, and developed as a reaction to CIAM's functionalism. The development of new approaches in architecture in that period was aimed at abandoning functionalist paradigm and turning to formal aspects and physical interrelations between architectural elements, which found theoretical background in structuralism. Michael Hays pointed out that architecture 'tried' to resolve the search for meaning by applying structuralistic projections of the system of formal elements and rules of combinations and transformations that were analogous to rhetorical formations in the language. The central issue of structuralistic approach is related to the connection between physical and semiotic (meaning-related) structure, i.e. to invisible laws that define and form the elements of structure. In contrast to the common formalistic approach, the form in structuralism is interrelated with the content. Lévi-Strauss noted that structuralism does not oppose the abstract and the structure is not separated from the content which is realized through the logical organization as the quality of reality.² Pertinent to this, the initial concepts of structuralistic form in Yugoslav architecture have been developed by pointing out the importance of integration of constructive and formal elements and by creating the organic whole. Different approaches in the application of formal aspects could be observed in the anesthetization of architecture in Yugoslavia in the early 1950s: application of constructive aesthetics, exploration of relations between elements in architectural compositions, the idea of articulation of architectural form through smaller structures, the idea of evolutionary growth, development and transformation, and the concept of brutalistic form.

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¹ Michael Hays, *Architecture's desire – Reading the late avant-garde* (Cambridge: MIT Press, 2010), 23-50.

² Klod Levi-Stros, "Struktura i forma: Razmišljanja o jednom delu Vladimira Propa", u *Morfologija bajke*, Vladimir Prop (Beograd: Biblioteka XX vek, 2012), 217-255.

The constructive aesthetics

In the early 1950s, the progress in construction engineering facilitated an aesthetic approach in architecture. The breakthrough of new constructions in architecture enabled the incorporation of both, an improved technical component and 'emotional' need for aesthetical shaping. Pier Luigi Nervi, an engineer and architect, noted that without the interconnection between aesthetics, statics and techniques that were present in the past, there could be no architectural achievements and that 'only together those three spirits can create the true architecture'. Pertinent to this, the first concepts addressing structuralistic form emerged in Yugoslav architecture through the recognition of the importance of integration of constructive and formal elements and creation of the organic whole. In the article entitled 'Structuralism' that was published in 1960, Nikola Dobrović expressed enthusiasm for the aesthetics of constructivism as an integration of constructivist concepts and aesthetic and shaped forms. He pointed out that, in comparison to structuralism, previous constructivism was of relevance only as a program with defined aim to equalize architecture with construction, even if the latter is of poor value.⁴ In regards to this, the artistic approach to constructivist aesthetics represents a synthesis that should deliver new forms and constructions - 'Because of close relationships between technical and aesthetic qualities of an artwork, only impeccable structure can deliver architecture with character'.5

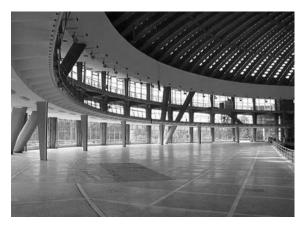
Belgrade Fair was one of the first works that were based on the principles of constructive aesthetics (1953-1957). Milorad Pantović applied original domal shape structures to construct fair halls and bring off an organic balance of form through a coherent composition of different elements of structure. In the Belgrade Fair project, Pantović renounced stiff orthogonal shapes and created round forms that are incorporated into the surroundings. The largest hall in Belgrade Fair complex – Hall I, was a constructive and technological experiment of engineer Branko Žeželj. The construction was made of prestressed concrete ribbed arches that were connected into a monolithic structure, with a 106 meters span, which was the largest in the world at that time. Two smaller halls – Hall II and Hall III were designed as thin shell pre-stressed concrete structures (only 9 cm thick). Uroš Martinović noted that the halls of Belgrade Fair represent the first urban super-structure in

³Nervi, P.L., "Odnos arhitekta, inženjera i konstruktora," *Čovjek i prostor* br. 108-109 (1962): 15.

⁴Nikola Dobrović, "Strukturalizam," *Arhitektura-urbanizam* br. 4 (1960): 20-21.

⁵Nikola Dobrović, "Strukturalizam," *Arhitektura-urbanizam* br. 4 (1960): 21.

Yugoslavia.⁶ An articulation of structural elements in the framework of round forms is also present in the project of Ivan Štraus - Aeronautical Museum in Belgrade (1969). Štraus creates a new aesthetics through the sculptural treatment of the object, which is based on the unity of technical and aesthetic postulates: 'Rational and sensible at the same time, he proves the existence of new contemporary aesthetics, the aesthetics of mechanical design, through forthright materials, clear constructive ideas, and visual beauty of form that is both, functional and rhetorical.⁷



Picture 1: Belgrade Fair (1953-1957), Milorad Pantović

Taken from: http://beogradskonasledje.rs/kd/zavod/savski_venac/hala_1_beogradskog_sajma.html

One lineage of experiments in the 1960s introduced umbrella-like structures into the Yugoslav architecture. The first structures in that form have been projected by Feliks Kandela in 1952. Kandela criticized functionalistic views that 'function makes an organ' and that 'form follows the function', and emphasized that the creation of new forms can be achieved only through structure and structuralistic solutions. Dobrović noted that 'the new constructive possibilities of reinforced concrete promote gradual metamorphosis of new aesthetics'. In Station House Kosovo Polje project (1964), Nikola Dobrović developed the structure by implementing the basic constructive element that resembles an up-side-down umbrella. Within the research project entitled 'The development of standardized design and prototypes of family house, with the full application of synthetic materials from domestic production', Jurij Najdahar worked on the development of serial residences from prefabricated elements

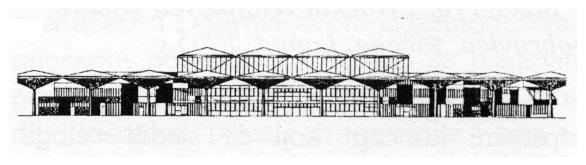
⁶Uroš Martinović, "Arhitektura, autori i ostvarenja." u:*Beograd: 1945-1975: urbanizam: arhitektura*, Bratislav Stojanović i Uroš Martinović (Beograd: Tehnička knjiga, 1978), 122.

⁷Nedžad Kurto (pred.), "Ivan Štraus: arhitektura : 1962-1986: Sarajevo - Banja Luka",Sarajevo: Akademija nauka i umjetnosti Bosne i Hercegovine, 1986.

⁸Nikola Dobrović, "Pokrenutost prostora – Bergsonove 'dinamičke sheme'- Nova likovnasredina, "*Čovjek i prostor* br.100 (1960): 11.

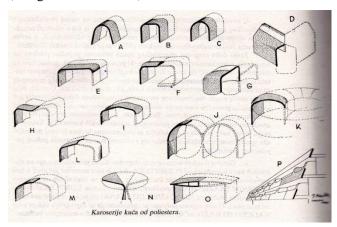
⁹M. Mitrović, "Stanična zgrada Kosovo Polje,"Arhitektura urbanizam br. 43 (1967): 34-35.

made from synthetic materials.¹⁰ Najdahar stressed out that such approach in architecture brings a brand new type of form that resembles the modelling of car body. Najdahar developed 'modular architecture' by assembling several units under one roof and by further organization of such structures within the residential area.



Picture 2: Project Station House Kosovo Polje (1964), Nikola Dobrović

Taken from: Marta Vukotić Lazar, *Beogradsko razdoblje arhitekte Nikole Dobrovića: (1945-1967)* (Beograd: Plato, 2002), 123.



Picture 3: 'The development of standardized design and prototypes of family house, with the full application of synthetic materials from domestic production' (1966), Jurij Najdahar

Taken from: Jelica Karlić – Kapetnović, *Juraj Najdhart život i delo* (Sarajevo: "Veselin Masleša", 1990): 238.

The articulation of architectural form through smaller units

Yugoslav architecture implemented a formal structuralistic approach which promoted the articulation of smaller units within architectural composition. This had an impact on the perception of anesthetization of architectural forms and promoted the development of more humane living environments, which was in contrast to the previous functionalistic approach. Arnulf Lüchinger acknowledged the time as an important formative factor (the fourth factor), and pointed out that growth, coherence and transformation represent the main principles of

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¹⁰JurajNeidhardt, "Sintetička kuća," *Čovjek i prostor* br. 164 (1966): 7.

structuralism in architecture. 11 The articulation of architectural form through smaller units was aimed to make architecture more comprehensible to people. According to Hertzberg, the structures may become large only through a multitude of smaller units, because any excess provokes repulsion.¹² The project for Museum of Contemporary Art in Belgrade (1961) by Ivan Antić and Ivanka Raspopović was conceived as a series of crystal forms that can be multiplied if needed. Through aesthetic constructive forms, the object gained a complex crystalloid structure which is composed of orthogonal, clear-cut, cubic bodies. The spatial coordination is generated by the shearing of two rectangular planes, the intersection of vertical slopes, and cascade organization of horizontal planes in the interior groups of exhibition units. The main value of Museum of Contemporary Art lays in 'the crystal forms that can be functionally multiplied'. 13 Ivan Antić and Ivanka Raspopović implemented the concept of growth also in the project Museum '21st October' in Kragujevac (1968-1975). The project is based on a three-dimensional module 3×3×3 m, which is multiplied to generate all elements of Museum. The form of the object abides to the principle of three-dimensional grid, which is developed as irregular series of vertical cubic forms of different heights from 4.5 m to 21.5 m. The object is placed into geometrically organized space, which is put, together with the abstract memorial content, into an abstract context of realistic continuum.¹⁴



Picture 4: Project Museum '21st October' in Kragujevac (1968-1975), Ivan Antić and Ivanka Raspopović

Taken from: https://sr.wikipedia.org/wiki/Спомен-музеј_"21._октобар"_Крагујевац

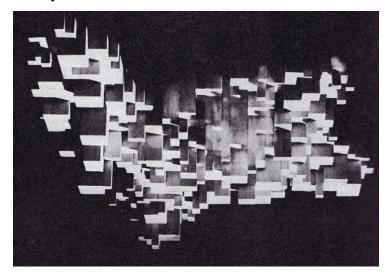
¹¹Arnulf Lüchinger, *Structuralism in Architecture and Urban Planning* (Stuttgart: Karl Kramer, 1981), 43.

¹²Herman Hetzberg, "Ideologija Strukturalizma," *Čovjek i prostor* br. 291 (1977):27.

¹³Зоран Маневић (ред.), *Лексикон неимара* (Београд: Грађевинска књига, 2008), 9.

¹⁴______, "Миzej и Kragujevcu," *Arhitektura urbanizam* br. 33-34 (1965): 39. Видети у: Љиљана Благојевић, "Стратегије модернизма у планирању и пројектовању урбане структуре и архитектуре Новог Београда: период концептуалне фазе од 1922. до 1962.године" (Докторски рад, Архитектонски факултет Универзитет у Београду, 2004): 118.

In the design concept for Youth Centre 'Sedam Sekretara SKOJ-a' (1966), Andrija Mutnjaković explored experimental and avant-garde features of architecture that could properly represent the memorial for the fallen young communist leaders. The synthesis in Mutnjaković's project relied on contemporary exploration of the phenomenon of shaping the volume, pointing out the problem of formalism and artificiality. Mutnjaković projected structural shape by adding volume and created dynamics through wavy growth of forms. The object contains 500 units, and the construction could begin with any of these units and may encompass any number of units: 'Structural agglomeration does not have composition elements. It represent a complete structure in any stage of construction, which means that the object can be built in a large number of phases, in accordance with economic capacities of the society'. ¹⁶



Picture 5: Design concept for Youth Centre 'Sedam Sekretara SKOJ-a' (1966), Andrija Mutnjaković Taken from: Andrija Mutnjaković, *Biourbanizam* (Rijeka: Izdavački centar Rijeka, 1982): 94.

The exploration of interrelations between elements in architectural structure

Structuralistic experiments focused on interrelations between elements of the whole that function and are organized and formed by invisible laws. Architect Vjenceslav Richter addressed the theme of such interrelations: 'Contemporary spatial expression represents materialization of the most eminent spiritual ideals, which are reflected in new order and relations that are recognized here as well abroad'. ¹⁷ Richter explored the laws of organization of sculptural elements in architecture and introduced aesthetical and logical visual experiment in the field of spatial geometry. Richter pointed out that large complex forms can be

¹⁵Andrija Mutnjaković, *Biourbanizam* (Rijeka: Izdavački centar Rijeka, 1982), 89.

¹⁶Andrija Mutnjaković, *Biourbanizam* (Rijeka: Izdavački centar Rijeka, 1982): 86.

¹⁷Vjenceslav Richter, Sinturbanizam (Zagreb: Mladost, 1964): 16.

conceived in a way so that spatial and formal relations result in a harmonic synthesis of all nominal units. The starting point of Richter's formal explorations were models of systematic forms that used sphere and cube, curved and flat surfaces, circle and square, and observation and postulation of relations between these elements to produce new spatial structures. One example of Richter's work is an experimental model named Reljefometar (1964), which is based on the design of mobile prefabricated orthogonal units. Since the number of formal relations between mobile elements is unlimited, Reljefometar represents an open system with unpredictable and immense combinatory potential.¹⁸ System theory, which explored the relations between units and the whole, and the derivation of meaning, i.e. the manifestation of creative imagination through the interactions of elements and principles, enabled Richter to develop projects with solutions for the synthesis of human environment - sinturbanism (1964). Sinturbanistic city is composed of variations and multiplications of same elements, whereas a diversity is accomplished by the presence and composition of the system. This approach overcame the absence of system in contemporary heterogeneous agglomerations and urbanistic monotony, achieving urban intimacy of Mediterranean cities. In the project 'Catering School' in Dubrovnik (1962), Richter applied the style of ancient builders, who established objects on slopes.¹⁹ By disintegration of spatial mass, Richter showed that visual surroundings can be shaped by simple means and dynamic change of spatial intervals, which forms a synthesis of ambient.



Picture 6: Project 'Catering School' in Dubrovnik (1962), Vjenceslav Richter

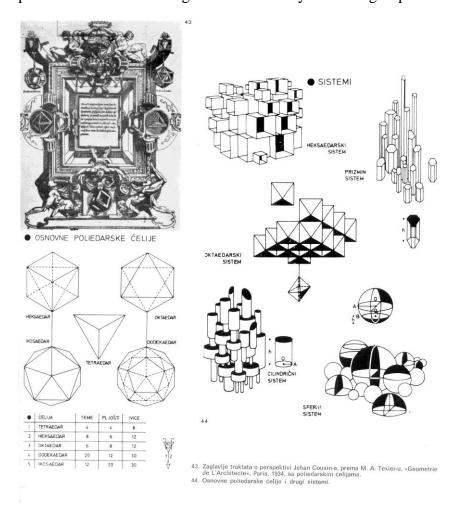
Taken from: Vera Horvat-Pintarić (red.), Vjenceslav Richter (Zagreb: Grafički zavod Hrvatske, 1970).

Djordje Petrović presented visual explorations of structuralistic form and the experiments of interior of structures through perception of relations between units of space in monograph 'Visual Research of Human Environment and Urban Design' (1972). Petrović

¹⁸ Vera Horvat-Pintarić (red.), *Vjenceslav Richter* (Zagreb: Grafički zavod Hrvatske, 1970), 15.

^{19 . &}quot;Ugostiteljska škola u Dubrovniku," *Arhitektura* br. 5-7 (1961): 5.

brought together visual exploration and different optical structures that facilitate the development of creative capacities in the organization of visual experience, the originality of individual expression, and three-dimensional experience which enables the perception of environment, analysis, organization, and synthesis of architectural space. Petrović conducted visual experiments in the courses at the Faculty of Architecture in Belgrade, exploring interrelations between elements – 'cells' of the model, convergence, support, contact, overlap, and structural aspects of the system. He started the organization of the system with transparent or non-transparent material elements and further explored new spatial qualities of dimensions, relations and optical experiences through confrontations of surfaces of the elements. Alterations of visual impressions were developed by light and shadow, the illusion of vibration of space. New forms are built by 'cell' moving, whereas rotation is used to transform initial composition of 'cells' into new systems. This opened new unpredictable possibilities for combining the cells of the system into groups.



Picture 7: Basics of Polyhedron cells and other systems of Đorđe Petrović

Taken from: Đorđe Petrović, *Vizuelna istraživanja čovekove sredine i urbani dizajn* (Beograd: Beogradski izdavačko-grafički zavod, 1972): 41.

By accepting structuralistic concept, the perception of architecture is placed into a context of the structure that provides an insight of interrelations between elements. The elements are constant, whereas the changeability of structure is enabled by interrelations between elements. ²⁰ According to Hertzberg, the structure represents harmony and unity: 'It is the way the elements function or connect'. 21 Aleksej Brkić examined the theme of architectural form as logical system in the series of texts 'The Inversion of Dialectics of Form' in Izgradnja journal (1978-1979).²² He pointed out that 'the architecture is real as much as it represents a logical framework or system'. ²³ According to Brkić, the form as presentation and architecture does not contain absolute norms or ideals. It is a product of specific logic or social reflection of a certain truth that is derived from previous, inter-dependant truths.²⁴ The design has dual role in human survival – real, as an object of physical relevance, and abstract as an object with specific statement. In the project of business building 'Invest-Import' (also known as Hempro building; 1953), Brkić diverged from functionalistic schemes and opted for 'actual' multilayered architecture to promote the frequency of events in the system. He was one of the protagonists of intellectual avant-garde that showed a resistance to traditional construction and orthodox functionalism.²⁵ His inspiration was the rhythm of streets in faraway lands, 'where the architecture was born'. He wrote: 'Closely packed buildings, intersections of walls, sudden breaches, sun in the zenith, sun on the horizon, playful colours, and bottomless infernal shadows, all kinds of movements and crossings, created a magnificent theatre from events in the streets."26

Brutalistic form

Brutalism was developed in the late 1950s. It was characterized by the use of 'raw' concrete ('beton brut' in French), which emphasized the aesthetics of form of the object. Team X generated two different movements – new brutalism, which was developed by English members with Alison and Peter Smithson being the most prominent figures, and

²⁰Arnulf Lüchinger, *Structuralism in Architecture and Urban Planning* (Stuttgart: Karl Kramer, 1981),16.

²¹Herman Hertzberger, *Architecture and Structuralism. The Ordering of Space* (Rotterdam: naio10 publishers, 2015), 32.

²² Eight articles have been published: Aleksej Brkić, 'Inverzija dijalektike oblika', *Izgradnja*, 6 (1978), pp.1-8; 7 (1978), pp.1-8; 8(1978), pp.1-8; 9 (1978), pp.1-8;11 (1978), pp.1-8; and 1 (1979), pp. 1-8; 2 (1979), pp.1-8; 3 (1979), pp.1-8.

²³Aleksej Brkić, "Inverzija dijalektike oblika (II) logika oblika," *Izgradnja* br. 7 (1978), 3.

²⁴Aleksej Brkić, "Inverzija dijalektike oblika (III) logička matrica funkcije," *Izgradnja* br. 8 (1978), 2.

²⁵Зоран Маневић (ред.), *Лексикон неимара* (Београд: Грађевинска књига, 2008), 58.

²⁶Алексеј Бркић, *Знакови у камену: српска модерна архитектура: 1930-1980* (Београд: Савез архитеката Србије, 1992), 147.

structuralism, which was developed by Dutch members with Aldo van Eyck and Jacob Bakema as leaders. Although both of these movements originate form Team X and the critique of functionalism, they differ in material processing and the organization of function. New brutalism emphasized the authentic aesthetics of raw materials with their overt natural structure. With the unveiling of 'the truth of materials', concrete, which was previously a constructive material with no aesthetic effects, became an element of decorative and visual expression. Concrete was casted using a rough wooden formwork with the aim to produce an effective and interesting appearance. Rich plastic and sculptural expression of monolithic brutalistic buildings accentuate content and function as well as the form of the object. Brutalistic structures are formed by the repetition of modular elements that are grouped in specific functional zones making one complex, which makes the concept of the object comprehensible.

Many projects of Yugoslav architects in the late 1960s and early 1970s showed elements of brutalism. The works of Mihajlo Mitrović from that period contain two architectural concepts – new brutalism and critical aesthetics.²⁷ In the project of Hotel 'Putnik' in New Belgrade (1970-1971), Mitrović applied raw, unfurnished concrete, cylindrical and cubic forms, and a combination of horizontal and vertical fragments of facade, to generate structural composition of 'megalithic contours'.²⁸ He also used the sculptural approach, rough materials, and brutalistic principles for the project 'Geneks Towers' in New Belgrade (1980). Inspired by contemporary Japanese architecture, Mitrović designed residential and business towers that are connected via attic storeis. This project was presented at the exhibition of brutalism in Wien in 2008.²⁹

²⁷Miloš Perović, *Srpska arhitektura XX veka: od istoricizma do drugog modernizma* (Beograd: Arhitektonski fakultet Univerziteta u Beogradu, 2003), 183.

²⁸Aleksandar Kadiljević, *Mihajlo Mitrović: Projekti, graditeljski život, ideje* (Beograd: S. Mašić: Muzej nauke i tehnike: Muzej arhitekture, 1999), 68.

²⁹Mihajlo Mitrović, Arhitektura Beograda 1950-2012(Beograd: Složbeni glasnik, 2012), 128.



Picture 8: project 'Geneks Towers' in New Belgrade (1980), Mihajlo Mitrović

Taken from: Aleksandar Kadiljević, *Mihajlo Mitrović: Projekti, graditeljski život, ideje* (Beograd: S. Mašić: Muzej nauke i tehnike: Muzej arhitekture, 1999), 73.

Institute of Urbanism that was designed by Branslav Jovin and built in the centre of Belgrade in 1970, represented 'a reflection of recent brutalistic experiments in the world'.³⁰ In the project 'Residential Block in Red Army Boulevard' (1971-1974), Stojan Maksimović developed a scattered structure of the object. According to Manević: 'The combination of concrete, as the constructive element, and bricks, as facade pannel, reflects Maksimović's style, adopted *credo*, the principle of organic sythesis of differet constructive methods, function and elements of visual art.³¹ In the project Electric Substation 'Filmski grad' (1977-1979), Aleksandar Djokić formed a compositions of elements of circle, cylinder and arch, merging them into playful scattered brutalistic form.³²

³⁰Aleksandar Ignjatović, "Tranzicija i reforme: arhitektura u Srbiji 1952-1980", u *Istorija umetnosti u Srbiji XX vek. Realizmi i modernizmi oko Hladnog rata*, (eds.) Miško Šuvaković, Nevena Daković, Aleksandar Ignjatović, Vesna Mikić, Jelena Novak i Ana Vujanović (Beograd: Orion Art i Katedra za muzikologiju Fakulteta muzičke umetnosti, 2012),701.

³¹Зоран Маневић (ред.), *Лексикон неимара* (Београд: Грађевинска књига, 2008), 247.

³²Aleksandar Kadijević, "Expressionism and Serbian Industrial Architecture, "Zbornik Matice Srpske Za Likovne Umetnosti 41 (2013): 110.

Conclusions

Structuralistic approach performed a radical critique of functionalism through explorations of relations between elements and of universal laws of social and cultural structures. Structuralism also criticized formalism which emphasized a structural approach to architectural form but was limited to the manifestation of form not going into deeper comprehension of relations between elements. Structuralistic approach insisted on the liberation of architecture from the elements of formalism, and promoted new freedom of interrelations through temporal transformation of architectural form and adaptation and flexibility through the addition, subtraction and alteration of shapes. The critical approach of the members of structuralism movement promoted the change of functionalistic principles and values in Yugoslav culture of high modernism. In that context, a new contemplative system, which was oriented to formal and semiotic approach, was established. In the early 1950s, Yugoslav architecture showed a progress in engineering construction, which enabled the creation of balance between aesthetic forms and constructive foundations of objects. At the same time, regarding the development of concept of time/duration as a generic factor, themes of growth, development and evolution, as well as semiotic approach that reflected in the importance of interrelations between elements of the system, were introduced into architecture. The aspiration for anesthetization of architectural forms through articulation of harmony of elements influenced the development of connections between formal structure and the meaning of structural elements in Yugoslav architecture.