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FACULTY OF CIVIL ENGINEERING AND ARCHITECTURE

in cooperation with
UNIVERSITY OF NOVI SAD
FACULTY OF TECHNICAL SCIENCES
DEPARTMENT OF CIVIL ENGINEERING AND GEODESY

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EDITORIAL NOTE:

The Faculty of Civil engineering and Architecture of University of Nis organizes the Fifth International Symposium of Doctoral Studies' Students in the fields of Civil Engineering, Architecture and Environmental Protection "PhIDAC 2019".

The first Symposium of the Doctoral Studies' Students "PhIDAC 2009", held in September 2009 in Nis, confirmed the expectations of Prof. Slavisa Trajkovic and Professor emeritus Radomir Folic, the founders of this symposium, that the two-day meetings of the students of Doctoral studies and their professors would be of invaluable use both for young researchers and their tutors. Namely, a great number of published and presented papers, as well as open discussion on the quality of paper, directions in further researches and relationships between doctoral students and tutors demonstrated that the Symposium fulfilled the expectations of the participants and that the organization of new meetings should be continued.

At the Second Symposium "PhIDAC 2010" held in Novi Sad, the symposium programme was expanded, i.e. the field of environmental protection was also introduced as the third thematic field with the expectation that this multidisciplinary area should be more closely introduced to young researches in the fields of civil engineering and architecture.

The organizers of the Third Symposium "PhIDAC 2011", also held in Novi Sad, decided that the symposium should be international and thus they opened new possibilities for affirmation and development of young researches from Serbia, as well as of their colleagues from the Balkans.

There were 66 papers dealing with topics in the fields of civil engineering, architecture and environment protection that were submitted for the fourth international symposium of students of doctoral studies "PhIDAC 2012". The papers covered a wide range of scientific topics. All the papers were reviewed. On the basis of the reviews, it was concluded that the young researchers provided a significant contribution to the development of scientific thinking.

Members of the international scientific committee actively participated in the preparation of the symposium and reviewing of the papers. For this symposium too, the proceedings including papers in English and Serbian were included, which provides better and more productive communication and exchange of experience with the colleagues from abroad.

We would like to thank all the authors and co-authors of the papers and their mentors, and it is our wish that the young researchers would continue their successful careers and persist in realization of the goals they have set.

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Mila Cvetković³

HOUSE DESIGN: MAKING THE COMPOSITION BY DECOMPOSING

Abstract: The paper deals with the issue of architectonic composition in the scope of housing design. It analyses the potential of functional decomposition within an architectural arrangement of the structure. Instead of the compact, which is more common when it comes to houses, the division of the program content can create a non-compact building. In that case, because of its fragmental design, the house gains specific appearance concerning form and function, that in a great way affects the living. Regarding this, the paper strives to find out what are basic features of this kind of design, as well as what it offers. In order to investigate the given thematic better, the research relies on analysis of few representative architectural projects, done through case studies.

Key words: housing, composition, decomposition, design, concept

1. INTRODUCTION

Tendencies to become more eco-conscious in a world "stripped of nature", innovations driven by developed technologies, adaptation to contemporary lifestyle of rapidly growing population, try of mitigation of negative footprint people are leaving on environment, aspiration to creativity and uniqueness and many other issues of a modern humankind, have caused search for a new housing solutions that would be able to satisfy complex human needs of nowadays. Housing architecture has never been richer in typologies of different kinds, both in high rise and low rise buildings, i.e. multi-family and single family-living. Typologies depend on many aspects, e.g. social, economical, location, cultural, religious, inseparable triple context of time, space and program, and other related, both personal and objective. Generally and simplistically speaking, all of them have a same mission - to provide one with a shelter, but countless ways of achieving the basic goal, in addition to specific requirements, make a typology palette more than colorful. This especially goes for the fact that the housing is actually not only a shelter, a roof, above the head [6] and that one strongly identifies himself with the space in which he lives, as well as for the fact that the "science" called architecture, in parallel to the satisfaction of users' needs, seeks for the sublime goal, which results in abundance of concepts, that lie behind the scene. Inspired by the words of the architect Oswald Mathias Ungers: "A building without a theme, without a supporting idea, is an architectural work without theoretical foundation", that follow his statement: "The need for a thematisation of architecture means nothing if not moving away from the blind alley of pure functionalism or [...] from stylistic aberrations and a return to the essential content of architectural language" [7], and the above mentioned text, this article tempt to explore the creativity of the architectural design process in domain of housing design. Building upon the previous research [5], the paper deals with investigation of an uncommon approach to architectural design of the houses, based on decomposition of the form and function. This conceptual idea is recognized as one of the many modern house typologies, which actually tend to bring the living to its natural habitat.

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2. HOUSING TYPOLOGIES

The most common way of creating a house composition in Western world is to define unique space and divide it, with partitions, into rooms, distributed along one or several vertical levels. The house is considered as the inside space and outside of it is garden. Eastern world, primarily Japan, conceptualize the house in a slightly different manner. Its life philosophy is more oriented to the nature, so the greenery is very important part of the house, and therefore it penetrates inside of the living space, creating some spaces of dual character (merging of interior and exterior). Although the rooms are not that strictly defined as in the Western houses, since the need for flexibility makes the partitions act rather as space unifiers than separators, still, the composition of the house is solid. In hot climate zone, weather allowance of the even usage of open and closed spaces and higher necessity for sunshade, assert the atrium typology as a frequently used model of housing. The organization of an atrium house, is subordinate to the central open space, so the rooms are lined up around the inner garden. Its composition has certain perforations in form, but again, the composition is considered to be compact.

In contrary to mentioned models, the researched housing typology basis its composition on decomposed form. Decomposition is the key element of the organization. Related contents are grouped in physically defined units which are, as freestanding fragments, scattered inside the spatial frames of the composition. That means that the housing unit is composed of certain number of units, instead of the rooms.

2.1. Classification

Based on the criteria of connecting type (link between structures) and general spatial arrangement, it is possible to make a classification of the researched typology into: (a) linear, (b) circular, (c) randomly scattered and (d) vertical type (Fig. 1).

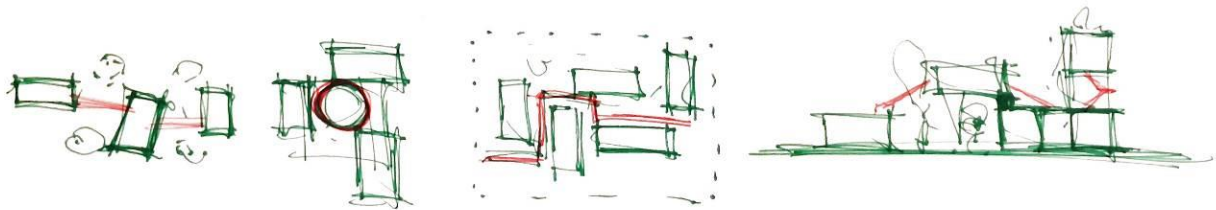


Figure 1 – Schemes of the types based on the connections inside the composition: (a) linear, (b) circular, (c) randomly scattered and (d) vertical type

As a descriptive example of linear type can be shown *Miravalle House* by *Colectivo 720* (Fig. 2). The house composition consists of four spatially independent volumes, connected with short corridors, which allow linear circulation through the house (Fig. 3a). The volumes group programs of different use, dividing them into those of more social and those of more private nature [3]. The path through the architectonic composition starts with the services, which are close to the entrance (garage and rooms for the service), than goes through the dining and kitchen area, continues to the living space and finally leads to the most private volume of sleeping rooms. The volumes assert privacy zones and set them in a logical order, that changes its strength from the "public" to "intimate" (Fig. 3b). The composition actually relies on the surrounding environment and its vivid configuration. The longitudinal axis enables all the spaces to establish the closest relationship with the nature, which is especially achieved by the well set moving line trough the house - "promenade route" [3], as the architects name it, emphasizing its importance in achieving "a sequence of visuals directed and escaped into the landscape and into the interior of the living place" [3]. Volumes' layout, their shift out of ortogonal grid, creates also the in between open gathering spaces, which serve as structure connectors in functional way as well as valuable extensions of inside content (Fig. 3a).



Figure 2 – Miravalle House, Colectivo 720, Jamundí, Colombia, 2017: photo (left), ground floor plan (right)
 Images source: <https://www.archdaily.com/911926/miravalle-house-colectivo-720>, Accessed 14 Sep 2019

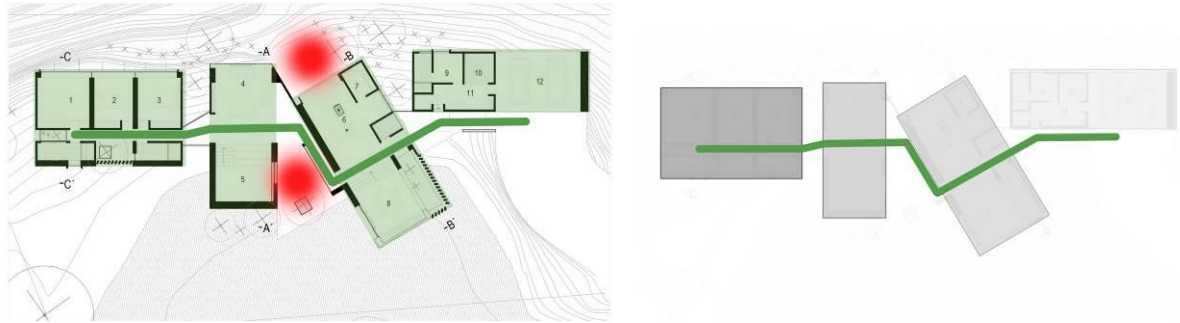


Figure 3 – a) Sketch showing integral volumes of the composition (green), open gathering spaces (red) and circulation path in Miravalle House by Colectivo 720, Jamundí, Colombia, 2017*; b) Scale of privacy
 *sketch done on the ground of the architects' drawing for the purpose of the research

Circular type arranges the volumes around the central space, which is considered to be main gathering space of the architectural composition (examples: *House for Trees* by VTN Architects (Fig. 4) and *Suburban Family House* by Hristina Krstic (Fig. 5)). It is visually most prominent, focal, point of the house (Fig. 6) and the crossroad of the most frequent circulations; the place where residents meet themselves by accident or intentionally. In metaphorical terms, that space takes over the roll of a square [5], and is a key element both for functional and spatial organization inside the structure. Having in mind the different uses it has - a garden, a living room, open dining room, place for leisure activities, playground for kids - one can emphasize its multifunctionality and thus, the higher importance and value it has in comparison to other spaces of the house. Further, regarding the impact that space leaves on the comfort of living, in terms of living conditions, it is possible to talk about the higher value of the whole house of the reserched type in comparison to the commonly known house.



Figure 4 – House for Trees, VTN Architects, Tan Binh District, Vietnam, 2014: photo (left), ground floor plan (right)
 Images source: <https://www.archdaily.com/518304/house-for-trees-vo-trong-nghia-architects>, Accessed 14 Sep 2019



Figure 5 – Suburban Family House, Hristina Krstic, Vilnius, Lithuania, 2019, Conceptual design: 3D model of the house (left), ground floor plan (middle), central gathering space 3D view (right)

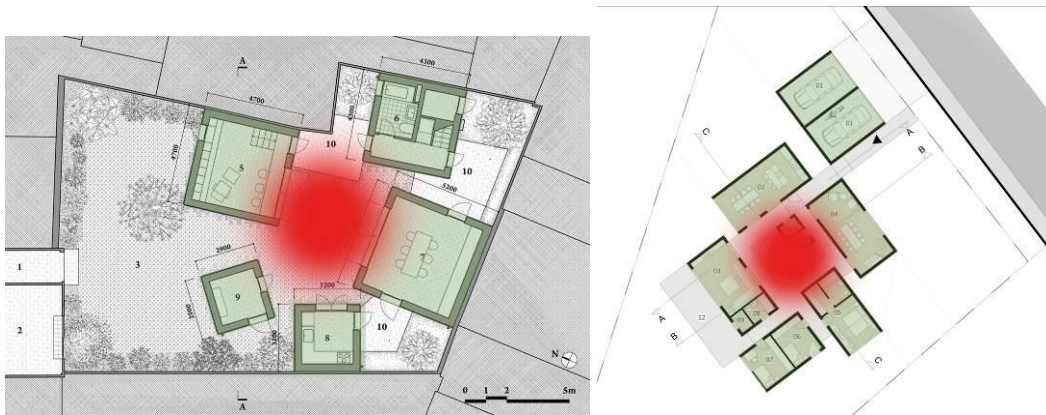


Figure 6 – Sketch showing integral volumes of the composition (green) and central gathering space (red) a) in House for Trees by VTN Architects, Tan Binh District, Vietnam, 2014* and b) in the project of Suburban Family House by Hristina Krstic, Vilnius, Lithuania, 2019*

*sketch done on the ground of the architects' drawing for the purpose of the research

Randomly scattered type is characterized by, at the first sight, adrift scheme of the house organization. The volumes are interspersed within the certain spatial boundaries with no particular order. Normally each volume carries one singular functional content or a set of few related functional contents. Circulation inside the house is transit between volumes and can be pretty much chaotic. Sometimes it is subjected to weather conditions (like in *Moriyama House*, Ryue Nishizawa, Tokyo, Japan, 2005 [4]), when spaces between the volumes are open air. Instead of one big central, there are many smaller gathering spaces, less exposed than in a composition of circular type (Fig. 7). Level of decomposition of the architectonic composition varies according to the level of disparity. The higher fragmentation expresses the higher complexity.



Figure 7 – House in Buzen, Suppose Design Office, Buzen, Fukuoka, Japan , 2009: photos (left), sketch showing integral volumes of the composition (green) and central gathering space (red) (right)*

*sketch done on the ground of the architects' drawing for the purpose of the research

Images source: <http://www.archdaily.com/50701/house-in-buzen-suppose-design-office/>, Accessed 23 Nov 2016

So called vertical type refers to the scheme where the composition is additionally spatially disperse not only horizontally, but also along the vertical axis. The volumes are scattered all around the place in different vertical planes, often stacked one on the top of the other, which brings chaotic feeling to the architectural expression. Inevitable project when examining this type is definitely *Sou Fujimoto's House before House* (Utsunomiya, Japan, 2008 [2]), designed as some kind of the experiment of living, that relies itself on a coexistence of nature and humanmade crations. Another project interesting to mention is *House in Azeitao* by Aires Mateus (Azeitao, Portugal, 2003 [1]). The project is unique conversion of an old winery's warehouse into housing space, where the specificity of the old building has caused unusual approach to the conversion's design. Due to the huge ceiling high and the monospace, it was possible for architects to play with the emptiness, the result of which was, litterray said, architectonic sculpture with a primary purpose of housing (Fig. 8). Scattered inside of the envelope of the old building, the "private" volumes, i.e. the rooms, "hover" over the common space of open-plane design, offering the original architectonic solution for the new users.



Figure 8 – House in Azeitao, Aires Mateus, Azeitao, Portugal, 2003: photos (left), sketch showing integral volumes of the composition (green) (right)*

*sketch done on the ground of the architects' drawing for the purpose of the research

Images source: <http://www.archdaily.com/50701/house-in-buzen-suppose-design-office/>, Accessed 10 Jan 2017

3. PROS AND CONS OF THE DECOMPOSITIONAL DESIGN APPROACH

Grouping of the certain content creates well defined zones, which intensify privacy of residents inside the house. The children can be separated from the parents and thus each can enjoy its own space, with no need to be constantly controlled (Fig. 9a). It is often the case that common contents such as living and dining areas are placed in "in-between" free spaces formed by the grouped closed volumes that contain sleeping and auxiliary program of the house (Fig. 9b). The less private zones, "public spaces of the house", are open and reachable to everyone, while intimate spaces are hidden. On the other hand, in contrary to the increased privacy, the decompositional concept at the same time accentuates the importance of social relations, which is expressed through the frequent meetings of users in those open common spaces.



Figure 9 – a) Parents' room divided from children's rooms; garage, workroom and auxiliary facilities inside the separated structures; b) "In between" space as "public" space inside the house

Similar to [5] which examines the same typology, but observed from a different standpoint, it can be pointed out that decompositional approach to housing design is characterized by increased mutual relationship between the human and the nature in everyday living atmosphere, contributing in this way to healthier society. The fragmental organization allows the greenery to penetrate inside the living space, filling the empty spatial holes and setting up a co-living of people and nature. When it comes to the living in urban area, especially high density megacities, no doubt, decompositional approach is one of the strategies how the quality of life can be improved in the lack of, and, not rarely, absolute absence of green spaces.



Figure 10 – EC house, AM30 Taller de Arquitectura, Stephane Arriola, Atemajac de Brizuela, Mexico, 2017: photo (left), sketch showing integral volumes of the composition (green) and grouping of owners' and guests' spaces (red) (right)*

*sketch done on the ground of the architects' drawing for the purpose of the research

Images source: <https://www.archdaily.com/897042/casa-ec-am30-taller-de-arquitectura-plus-stephane-arriola>, Accessed 14 Sep 2019

Suitability of sharing the house, as a result of its division into segments, is another characteristic considered to be advantageous. Possibility to group the functions intended for owners and those intended for guests or renters (Fig. 10), gives more privacy while sharing compared to compact house. The partial segments can be considered as separate structures, that are not only physically split, but also functionally. The empty spaces in between them allow distances that increase the privacy. The sketch in Fig. 11 illustrates the convenience of the application of the concept in co-sharing living.



Figure 11 – a) Private spaces inside the shared house; b) "In between" space as "public" space inside the house

Disadvantages of the researched design approach in housing architecture can be seen in potential people's deprecation to accept uncommon housing model. Since the users of the space are persons, with its own habits, preferences and wishes, final product of housing design, a house, is subjected to personal judgment of users, and therefore in a great manner dependent on users profile. People's psychology often prefers already established principles, known environment, anything that is already accepted and verified, so it is the question whether the houses of this type would be appropriate for one to call it home.

3. CONCLUSION

Opposed to the common housing, where the house is realized through one structure, basic principle of the housing of a decomposition type is that one structure is conceived as one room (content/space) or a group of rooms (contents/spaces). The group of structures forms the house, almost like a group of buildings that forms the neighborhood and furthermore the city. The aim of the paper was to explore the specific idea of architectural approach to housing design, where the higher goal is put on the promotion of the importance of creativity solutions in living. There is no established formula for the organization of the house. It's clear. And there will never be one perfect to suit everyone's needs. But, the constant experimentation in conceptual stage of architectural design, can lead to customization of housing to users' life requests. This paper has in some way elaborated the idea of how decomposition can be used in spatial organization of the house. Relying on the projects from the practice, realizations and concepts, their analysis and comparisons, the research came to the classification of the typology into four different types, which general schemes can explain the functional-structural model of the investigated conceptual approach closer. Dealing with pros and cons of the researched typology, the paper does not take out any authors' critics, but gives subjective and objective circumstances under which its application is more or less appropriate. In the end, the paper proves that contrasts, when put together, doesn't have to annul each other. The composition can indeed be created from decomposition.

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