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МАТЕМАТИКА, ФИЗИКА, СТРОИТЕЛЬСТВО, АРХИТЕКТУРА, ТЕХНИЧЕСКИЕ НАУКИ

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PHASES IN THE EVOLUTION OF ARCHITECTURAL CONCEPTIONS FOR RESORT DEVELOPMENTS
FROM ANTIQUITY TO THE BEGINNING OF THE 21ST CENTURY[©]**Introduction**

Today, the main driving force behind resort developments is tourism; but it had not always been so. Resort development, as an organized human enterprise, dates back to ancient Rome; long before tourism itself became an organized form of human enterprise after the Middle Ages. Through this long period, the architectural conceptions for resort developments have evolved in conformity to the society's perceptions of the needs of peoples for access to leisure, recreation and rest. The purpose of this work is to attempt to trace the search for appropriate architectural conceptions for creating suitable places for organized leisure, recreation and rest for man; with specific emphasis on resort developments.

A resort is a specially created recreational environment, designated for the purpose of granting guests the opportunities for long-term leisure and rest. It differs from all other places of organized rest and recreation in that it provides accommodations, in order to enable the guests to actualize their quests for long-term recreation.

Attempts have been made to associate man's quests for organized recreation and rest in modernity with the phenomenal rise that occurred in international tourism in the second half of the 20th century. According to the records of the United Nations World Tourism Organization (UNWTO), in 1950 the international tourists arrivals at the world's various tourism destinations amounted to 25.3 million people; and by the year 2000, 687.0 million international tourists were traveling around the world [23; 24]. According to A. Franklin [11], the "paradigm tourism theory" of modern tourism in particular, builds on two hypotheses, "namely: (a) that routine everyday life in modernity is such that people want or need to get away from it; and (b) the social space of tourism opposes the routine and offers extraordinary experiences that are missing and missed in everyday life." This tourism theory provides the architectural conceptual framework for viewing the modern resort as a place that should grant the tourists "extraordinary experiences that are missing and missed in everyday life". However, the quest for suitable places for organized leisure, recreation and rest are not peculiar features of modernity; they can be traced back to antiquity (more than two millennia ago).

The search for recreation and rest in antiquity

In antiquity baths began to emerge as significant social centres; fulfilling much more than the initially proposed functions of personal hygiene. Excavations in the city of Mohenjo-Daro (of the Indus Valley or Harappan civilization: 2500-1700 BC) have revealed bathing complexes, dated about 2000 BC. Similarly, remains of bathing complexes have been discovered in the royal palace of Knossos (dated between 1700 and 1400 BC), and also in the Egyptian royal city of Tall al Amārinah (dating back to 1350 BC). Ancient Greek vases show arrangements of public baths in some primitive states; but further improvements subsequently occurred. The earlier Greek public baths were built as adjuncts to gymnasia; but by the 5th century BC they became separate urban establishments (social centres), with separate facilities for men and women [6].

The remains of the earlier baths of ancient Rome (the baths of Stabiae of about the 2nd century BC; and the baths near Pompeii's forum of about 75 BC), indicate notable improvements (beyond the situations in ancient Greece) in the architectural conceptions of creating public baths as social centres. They were built around the central exercise yard (*palaestra*); and this became a notable distinguishing feature. The concepts of providing facilities for bathing at various temperatures were adopted from ancient Greece: dressing room (*apodyterium*); cold bath (*frigidarium*); warm bath (*tepidarium*); hot room (*calidarium*), which contained the hot baths (*alveus*); and the steam bath (*laconicum*). In their architectural conceptions therefore, these baths consisted of two distinct groups of functions: facilities for leisure and recreation (in the central exercise yard, where the daily routine began); and also facilities for personal hygiene - bathing and anointing of the body with oil (see Plate No. 1) [6; 17; 18; 20].

The Roman baths of the later periods show further improvements; and they also improved in scale, numbers and opulence, making recreation at public baths a very pleasurable aspect of urban social and cultural life in ancient Rome. A catalogue of buildings compiled in AD 354 showed that metropolitan Rome itself contained baths of various sizes, making up to a total of 952 baths [18]. The concepts of recreation were further expanded in order to incorporate facilities for diverse mental pursuits of leisure; and the zenith of this architectural conception was attained in the imperial baths. According to L. M. Roth, "Every Roman city of any significance had a theatre and a bath"; and also that the Roman baths (*thermae*) "were used for much more than simply washing":

They combined aspects of a modern health club with that of a public library and school, for the biggest baths (such as the Baths of Caracalla in Rome) contained shops, restaurants, exercise yards (*palaestra*), libraries, and lecture halls and reading rooms (*gymnasia*), all arranged around spacious gardens filled with sculpture (in fact, many of the surviving Roman copies of Greek sculpture were found in the gardens of these baths) [18, p. 233].

According to D. M. Robathan [17], the Baths of Caracalla (about 217 AD), which made provisions for as many as 1600 people, were the largest of the public baths that were ever built in ancient Rome; except for the Baths of Diocletian (built between AD 298 and 306), which provided for as many as 3000 people. Much care was taken to create the Baths of Caracalla in the form of a very impressive urban establishment. Emperor Caracalla laid out his baths along a newly created avenue (*Via Nova*) that ran parallel to the *Via Appia*. The baths were enclosed within a rectangular wall, with attractive shops at the front [Ibidem]. According to M. R. Scherer [20], the Roman baths “were not only bathing places but immense club houses”; and their concepts of recreation as “combination of care for body and mind was a contribution to civilization lost for several centuries after the Empire’s decline”.

Thus the most significant contributions of the baths of ancient Rome to the contemporary architectural conceptions for the development of places for organized leisure, recreation and rest are:

- the realization of the sheer scope of the facilities needed by man for organized leisure, recreation and rest even in antiquity;
- the incorporation into the concepts of recreation and rest, participation in diverse forms of favourite physical activities and mental pursuits of leisure;
- the incorporation into the concepts of recreation other favourite activities, such as: dining and entertainments, and also leisurely shopping.

Despite the immense contributions of the ancient Roman baths to the contemporary concepts of organized rest, recreation and leisure, they fell short of the actual architectural conceptions of resorts in that they did not make provisions for the accommodation of their guests (a fundamental attribute of resorts).

Resort developments from ancient Rome to the late 19th century

According to W. R. Eadington and V. L. Smith [10], metropolitan Rome “supported an estimated 1.5 million people”; and wealthy Romans wished to travel away from it, in search of “fresh air and a change of scene” during the summers [10; 12]. Several factors favoured the actualization of these desires in ancient Rome: the good road transportation infrastructures; the use of one single currency; and the use of one common language. Escaping from the summer heat of Rome became both possible and pleasurable to wealthy Romans; and thus emerged the culture of resort developments in ancient Rome [Ibidem].

On their way, on chariots, to their private resort villas, wealthy Romans usually spent some few nights in their private villas (*diversoria*) located along the way. Such private villas were finished with elegant furnishings, and were permanently staffed with servants. They served as transit stations for the journeys to the resorts; and were occupied only for a few nights in one year. In ancient Rome, resorts were created in conformity to the diversities in the elite society: locational diversities, varieties in cultural environments and distinctiveness in hierarchies; thus according to C. Holloway: “Naples itself attracted the retired and intellectuals, Cumae became the resort of high fashion, Puteoli attracted the more staid tourists, while Baiae was both a spa town and a seaside resort...” [Cited in: 12].

In Naples, wealthy Romans built their resort villas on piers over the water and watched the reflections of Mt. Vesuvius in the waters of the bay. Baiae is considered to have been the most luxurious and fashionable of all the resorts of ancient Rome; and it appealed most to the aristocracy of the empire. It was particularly notable for its mineral springs (thermo-mineral bathing), luxuriant vegetation and mild climate. It contained many magnificent villas, some of them belonging to the rulers and emperors of ancient Rome, such as Julius Caesar, Nero and Caligula. Much of Baiae became imperial property in the eras of Augustus and later emperors. Some notable events occurred in Baiae. At the time of the death of Julius Caesar in 44 BC, Cleopatra was staying at his resort villa in Baiae. Agrippina was killed there on the orders of Emperor Nero (her son) in AD 59. Emperor Hadrian died there in Caesar’s resort villa in AD 138. In Baiae were erected large buildings for the communal use of its elite clientele. Remains show three large domed buildings, previously erroneously referred to as temples. The “Temple of Echoes” (so named because of the way sound echoed from its 21.5 meter dome) had been erroneously called the “Temple of Mercury” since the 17th century; it is believed to have been the swimming pool of an immense bathing complex [4]. The building that was once erroneously named the “Temple of Diana” had a 29.5 meter dome; it is now believed to have been a casino [Ibidem]. Baiae emerged as the most popular of the resorts of ancient Rome, particularly during the later days of the Roman Republic. It was more popular than Naples, Pompeii and Capri; but its image was greatly marred by the fact it became notorious for hedonism, corruption and scandals [4; 5; 12; 13; 22].

However, in some specific sense, Baiae could be applied as a case-study of the architectural conceptions of resort developments in ancient Rome; and the following inferences would be derived: (a) the resorts were facilities that were restricted exclusively to the privileged classes of ancient Rome; (b) they contained magnificent private resort villas that had expansive servants’ quarters within them; (c) they also contained other magnificent communal buildings, designated for the use of their restricted clientele for leisure, recreation and rest.

The commoners fared quite differently within the resort development culture of ancient Rome. They stayed in small rented rooms located in the side streets. During their journeys to the resorts, they had their lodgings, meals and stables in “*tavernas*” that were built and run by farmers along the highways. In essence, they were there, only to perform of the services assigned to them [12; 13; 22].

After the demise of ancient Rome in the fifth century AD, travel for pleasure became very uncommon or was totally non-existent. According to A. Holden: "After the collapse of the Roman Empire in the west in the fifth century AD and the onset of the Middle Ages, travel became more difficult, and from the evidence of historical records was very limited. Travel was arduous, mostly undertaken out of a necessity to trade, or ... to prove one's religious devotion through pilgrimage" [12].

The concept of resort developments remained in abeyance for several centuries; reemerging about the 15th century in Europe, with notable similarities with the situations in ancient Rome. Firstly, the choices of locations for resorts were around mineral springs, the seaside, or in the mountains; or even a combination of all these three factors (as for example, St. Moritz). Secondly, they were designated for the privileged classes of the society - the aristocracy and the gentry [2; 3; 7; 19; 21; 26].

St. Moritz in Switzerland is situated at an altitude of 1856 metres in the Oberengadin (Upper Inn Valley), surrounded by picturesque Alpine peaks, near mineral springs (St. Moritz Bad) and on the banks of St Moritz Lake. It became a fashionable summer health resort in the 17th century. It is a leading winter sports centre today; and was the scene of the Winter Olympics Games in 1928 and 1948. Spa, a leading health resort in eastern Belgium today, has been noted for its mineral springs since the Roman times. The springs were rediscovered in the 14th century; and beginning from the 18th century, Spa became a fashionable health resort for the European royalty. The generic term "spa", now commonly attributed to health resorts with medical spring waters, is derived from the name of this resort town. Baden-Baden is located along the Oos River, in the Black Forest, in Germany. Its mineral springs were frequently used in Roman times; and some remains of Roman baths are still in existence. It is considered to be one of the world's greatest spas. It became a fashionable resort for royalty and nobility in the 19th century. Today, it is still a famous tourist health resort on account of its medicinal thermal saline and radioactive waters. Baden Bei Wien, a settlement of prehistoric origins, lies along the Schwechat River, 24 kilometers south of Vienna. It has been noted for its mineral springs since Roman times. In the 19th century, it became a famous summer resort for royalty and aristocracy, on account of its notable thermal sulfur-chlorine springs. Today it is a suburb of Vienna, and is still a leading summer resort in Austria. Yalta, another settlement of prehistoric origins, is located at the Black Sea, on southern coasts of the Crimean peninsula in Ukraine. Its unique location between the Crimean Mountains and the Black Sea grants it a mild climate and a very scenic beauty. It became the favourite resort of the Russian tsars and nobility in the 19th century. It is a popular holiday and health resort in Ukraine today. Other resorts of this period include Bath, Brighton and Isle of Wight in England. Like in ancient Rome, the resorts of this period were also specifically designated for the aristocracy; and they only consisted of private resort villas and communal facilities, belonging to or exclusively designated for the use of their specifically restricted clientele [Ibidem].

In the 19th century, the Industrial Revolution resulted in dramatic changes in the socio-economic structures of human societies; and these changes subsequently revolutionized the architectural conceptions for resort developments. Ordinary persons began to earn wages that enabled them to pay for the costs of organized recreation and rest; and they began to express demands for resorts. In consequence, the architectural conceptions for resort developments changed very significantly towards the end of that century. In this work, the peculiarities of these changes are demonstrated using Brighton, a resort located 82 kilometers south of London, as case-study.

Brighton began to emerge as a favourite seaside resort in England in the middle of the 18th century, following Richard Russell's decision to settle there and put into practice his theories on the health benefits of bathing in sea waters. In 1783, the Prince of Wales (who later became King George IV of Great Britain) began his several visits to Brighton; and this resulted in the increasing popularity of Brighton as a resort among the aristocracy of England. He subsequently erected his resort home at Brighton, the Royal Pavilion, which was built in the Indo-Saracenic style (an architectural style that was prevalent in India in the 19th century), and this was accompanied with exquisite Chinese interior decorations. In 1841 the railway connecting Brighton to London was opened. Following this event, ordinary folks began to travel from London, in order to spend their work-free days and short holidays at Brighton; and this rapidly resulted in the transformation of Brighton from an exclusive resort for the aristocracy, into a resort for people of all social classes. In 1850, the Royal Pavilion was purchased by the city. Today, the Royal Pavilion has been converted into a museum and art gallery, while its stables are now being used for hosting concerts and conferences; all for the purposes of advancing the prospects of tourism in the city. The Brighton Pier (built in 1899 and originally named the "Palace Pier") is now a public tourist facility in the resort; it features restaurants, arcade halls and funfair for the public (see Plate No. 2) [7].

Transformations similar to these occurred in resorts around Europe, converting them from their original positions as exclusive facilities for the cream of the society into public facilities designated for the use of all members of the society. By the end of the 19th century, a new form of understanding had begun to be established in the architecture of resort developments, to wit:

- the resort had become a place, specially created and designated for the long-term recreation and rest of people of all social classes;
- in order to fulfill this function efficiently, the resort must contain diverse facilities designated for recreation, entertainment and accommodations, in such a manner that the specific demands of diverse groups of people are met.

Resort developments in the present day

In the course of the 20th century, tourism emerged as the driving force behind resort developments. According to L. Mastny [16], international tourist arrivals increased 28-fold between 1950 and the year 2000 across the world; and correspondingly, directly or indirectly, “travel and tourism activities accounted for some \$3.6 trillion of economic activity in 2000 - or roughly 11 percent of gross world product” [Ibidem]. As an enterprise that creates destinations for international tourism, resort development now plays very significant roles in the economic development programmes of nations. In the architecture of contemporary resort developments, the aspiration is to create distinctive and memorable experiences; in order to engender in tourists the desires for repeated visitations, and to create the means of deriving more proceeds from international tourism [1]. Consequently, diverse trends have emerged in the architecture of contemporary resorts [1; 16].

The general trend of creating unique, distinctive and memorable resort buildings and complexes has been observed in all the inhabited continents of the world; and also in very remote archipelagos. In the Black Sea resort region of southern Russian some examples of this trend may be observed in the following resort buildings and complexes: Dagomis complex, Hotel Olympichskaya, Hotel Zhemchugzhina, Hotel Moskva etc. (see Plate No. 3) [1; 25].

The Las Vegas Strip in USA is a compact region of very large resort hotels (megaresorts); and here the aspiration is to create distinctive characteristics for each megaresort complex. The strategy that has been adopted here consists of the design of megaresort complexes along the lines of some predetermined themes - historical, urban, geographical or mythological themes. The theme of Megaresort Luxor is historical - ancient Egypt; it features the sphinx at its entrance and a 30-storey resort hotel complex that has been created in the form of an enormous pyramid of very darkly tinted glass, 110 metres high. The theme of Caesars Palace is similarly historical - ancient Rome. A number of urban themes have been also observed. Megaresort Venetian has as its theme the city of Venice in Italy, and several of the peculiar urban features of the city have been replicated in the megaresort: an artificial lagoon with gondolas and a replica of the Rialto Bridge etc. The theme of Megaresort New York - New York is the city of New York; it features the cityscape of the city and also a replica of the American Statue of Liberty. Megaresort Paris has for its theme the city of Paris; it features a replica of the Eiffel's Tower and other urban landmarks of the city of Paris in France. Megaresort Mirage has a geographical theme; it features a tropical landscape (see Plate No. 4). The resorts in the chain of Disneyland resorts are based on theme parks; and diverse themes have also been adopted in the designs of individual resort buildings and complexes.

Mythological themes seem to have some special interpretations within this sphere; they convey to tourists the impression that, in resorts, they are being admitted into a world of wonders and mysteries (extraordinary experiences that are absent from the familiar environments of modernity). The theme of Excalibur in Las Vegas, USA, is Arthur - the legendary king of the Britons; and Camelot, the castle of the legendary King Arthur is created in the megaresort. Other mythological themes include the “Sleeping Beauty's castle” (at Disneyland Resort in California, USA) and “Cinderella Castle” (at Walter Disney World Resort in Orlando, Florida, USA, and also at Tokyo Disneyland Resort, Tokyo, Japan) (see Plate No. 4).

In general, in the architecture of mass tourism resorts, the aspiration is towards distinctiveness and uniqueness; with ample provisions in high-density type accommodations (concentrated in the tourist areas), diverse forms of attractions and also various types of entertainments for tourists [1; 16; 25].

Ecoresort developments

The emergence of ecotourism, in the 1980s, and its rapid growth by early 21st century has been observed; the year 2002 was designated as the “International Year of Ecotourism” by the UN [8; 25]. This has led to the emergence of a distinctly new sphere in resort developments - architecture for ecoresort developments. Ecotourism flourishes in pristine natural environments, in the rural regions of countries; and is expected to fulfill a set of fundamental objectives in the present world:

- to enable tourists to have leisure in pristine natural environments, thereby affording them opportunities of conducting detailed studies and researches on the biological and cultural diversities of the world;
- to provide the means of generating the revenues, essential for the maintenance of nature conservation establishments;
- to provide the means of improving the livelihoods of indigenous peoples, living within the regions of nature conservation establishments.

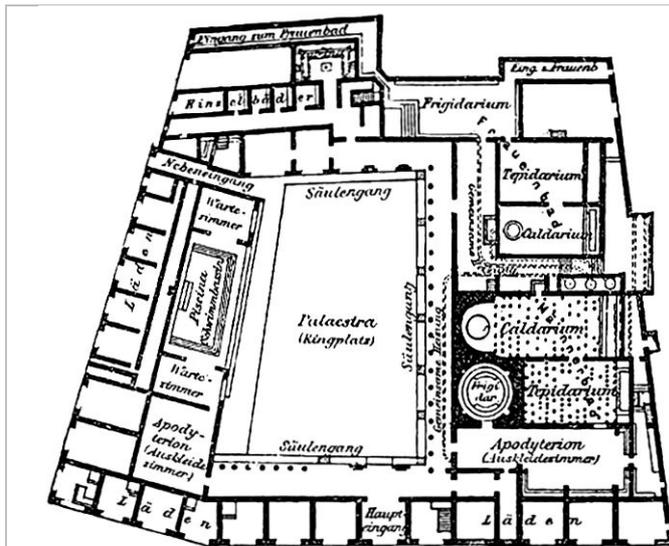
An ecoresort is a special type of resort establishment, created for the purpose of enabling tourists to actualize their desires for leisure, recreation and rest in pristine natural environments; it serves as a staging-point for scientific and other kinds of expeditions into national parks and other such environments. The architecture of ecoresorts is guided by fundamental principles: environmental sustainability (or ecological affinity), ecological sensitivity and contextualism (or cultural affinity). The definition proposed by R. K. Dowling outlines three distinctive attributes of an ecoresort: 1) “environmentally sensitive design, development and management”; 2) minimization of “its adverse impact on the environment, particularly in the areas of energy and waste management, water conservation and purchasing”; 3) “a vehicle for environmental learning and understanding” [9].

In essence, an ecoresort must not exert negative impacts on the environment; must respect and reflect the natural and cultural specificities of its location, and also enable the guests to make appropriate interpretations of those specificities [1; 9; 16; 25].

Conclusion

This review of the trends in resort developments has led to the following inferences.

1. The concepts of recreation and rest, as consisting of participation in diverse pleasurable physical activities, mental pursuits of leisure, entertainments and leisurely shopping etc. are traceable to the imperial baths of ancient Rome.
2. The concept of resorts as specially created establishments for recreation and rest is also traceable to ancient Rome. In ancient Rome and also in Europe (from the 15th century to the end of the 19th century) the architectural conceptions of resorts consisted only of creating exclusive facilities for the cream of the society.
3. The contemporary concept of resorts as places for organized long-term recreation and rest for people of all social classes emerged towards the end of the 19th century as a result of the Industrial Revolution.
4. The fundamental principles for ecoresort developments are: environmental sustainability (or ecological affinity), ecological sensitivity and contextualism (or cultural affinity).



Layout plan of the ancient Roman Baths of Pompeii
Source: Wikimedia Commons



View of the exercise court - palaestra of the ancient Roman Baths of Pompeii
Source: Wikimedia Commons



Artist's impression of Baiae by J. M. W. Turner
Source: Wikimedia Commons

Plate No. 1. The ancient Roman Baths of Pompeii and Baiae, a popular resort of ancient Rome



Royal Pavilion at Brighton is today a public facility (previously the symbol of Brighton as an exclusive resort for the royalty and the aristocracy)
Source: Wikimedia Commons



Present day view of Brighton Pier as a public facility (previously known as the Palace Pier and also another symbol of Brighton as an exclusive resort for the royalty and the aristocracy in gone-by days)
Source: Wikimedia Commons



Present day view of Brighton as a resort for mass tourism
Source: Wikimedia Commons

Plate No. 2. Case-study of Brighton (in Great Britain) demonstrates trends in the transformation (in late 19th century) of resorts from establishments exclusively designate for the use of the privileged classes of societies into places, available for the organized recreation, leisure and rest of people of all social classes



Hotel Olympichskaya, Soji in the Black Sea resort region of southern Russia



Dagomis complex, Soji in the Black Sea resort region of southern Russia

Plate No. 3. *The use of distinctive and memorable buildings and complexes in the architecture of contemporary resort developments. Source: Author's collections*



Megaesort Luxor in Las Vegas, USA
(historical theme: ancient Egypt)
Source: Wikimedia Commons



Megaesort New York - New York in Las Vegas, USA
(urban theme: New York City, USA)
Source: Wikimedia Commons



Sleeping Beauty's Castle at Disneyland Resort, California, USA
(mythological theme)
Source: Wikimedia Commons



Cinderella's Castle at Walt Disney World Resort, Orlando, Florida, USA
(mythological theme)
Source: Wikimedia Commons

Plate No. 4. *Trends in the application of predetermined themes in the architecture of resort buildings and complexes*

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MODELING OF THE DEVICE AND METHODS FOR MEASURING THE TURBULENT PRANDTL NUMBER IN A FLUID FLOW[©]

The table of symbols

<p>a - thermal diffusivity, m^2/s; L, Z_{max} - length of heat-exchange tube division; ℓ - grid pitch along axis Z; Pr - molecular Prandtl number; Pr_{tb} - turbulent Prandtl number; R_{max} - internal tube radius, m; r - radial coordinate, m; T_{in} - initial fluid temperature, °C; T_c - temperature in the upper heat exchanger, °C; T_b - bulk fluid temperature at a tube end, °C; U - averaged fluid temperature, °C; z - axial coordinate, m;</p>	<p>εa - thermal turbulent diffusivity; $\varepsilon \sigma$ - kinematic turbulent viscosity; $\varepsilon \sigma / \nu$ - turbulent transfer momentum; η - dimensionless distance from a wall; Θ - dimensionless temperature; λ - thermal conductance, $W/(m^{\circ}C)$; ν - kinematic fluid viscosity, m^2/s; ζ - friction drag; ρi - grid pitch along axis r; v^* - dynamic velocity, m/s; φ - dimensionless velocity; \bar{v} - average fluid velocity along tube cut, m/s; ωz - averaged fluid velocity in the line of axis z, m/s.</p>
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Introduction

Turbulence - is a very complex physical phenomenon, which is insufficiently examined, though much theoretical work and experimentation has been carrying out [7]. The notion of turbulent fluid flow is generally defined as a moving, when in a flow there are pressure pulsations and random velocity, which mix it. Besides, unlike laminar flow regime, an irregular mode of flow quantity changing is emphasized. A chaotic manner of changing characteristics makes it both impossible and unpractical to obtain the mechanisms, which describe the change of instant quantity values. From practical point of view, averaged quantity values of turbulent flow are the most interesting.