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Investigating the design of harmonious buildings in receiving radiant energy

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Introduction

The sun is one of the two most important sources of energy that should be addressed because it does not require advanced and expensive technologies and can be used as a useful source of energy in most parts of the world. The impact of climatic elements on residential environments is one of the practical topics of meteorology. In recent years, it has been important to harmonize buildings and residential environments with the prevailing climatic conditions and due to the high cost of energy in the world. In this study, hourly data of climatic parameters (humidity, minimum temperature, maximum temperature and sundial) have been used. Using Squre one software, Ecotect data analysis was performed and also the amount of energy received by the building through indirect radiation (absorption through walls and ceiling) was calculated. The results of the study of these calculations show that the peak Energy is between 16-16 hours. This is the time when materials with thermal delay are used in the building for an average of only 6-7 hours. The amount of energy from solar radiation for the building (penetration through windows, entrance doors and openings) was calculated for all three parts of the sample building designed for Tehran. The section plays a very effective role in reducing the internal energy of the building and cooling the air inside the building.

Methodology

The method of data analysis in this study is as follows: First, to determine the general climatic conditions of the region, meteorological data related to different elements are examined and analyzed-statistical methods using hourly data of climatic parameters (minimum Temperature, maximum temperature, average temperature and sunny hours), in a statistical period of 40 years (1965-2005) Mehrabad synoptic station in Tehran with Squre one, Ecotect software The amount of energy received by the building in three ways: direct, indirect and isolated in the region The case study is reviewed.

Design methods

Passive solar design uses a combination of building features to reduce or eliminate the need for mechanical cooling and heating and artificial daylight. Designers and builders pay special attention to the sun for heating and cooling needs. The design does not have to be complicated and ambiguous, but at the same time it requires knowledge of solar geometry, window technology and local climate. If there is a suitable building clock, it

can complete the passive solar design there.

Passive solar heating methods generally fall into one of three categories:

1- Direct reception 2- Indirect reception 3- Isolated reception

Results and Discussion

Examining the graph of calculating the amount of energy obtained through the entrances and openings of the building (entrance doors, window openings) for part 1 of the sample building designed for Tehran shows that in the warm months of the year window opening of this part plays a very effective role in reducing internal energy and The cooling of this part has been so that the maximum amount of heat energy loss in the months of May to September is from 22:00 to 08:00, which can have a major impact on increasing climatic comfort during the hot seasons of the year without the need to use systems. Have heat. However, in the cold months of this opening, due to the existence of suitable conditions in terms of thermal insulation, they have transferred little energy, and this can be seen well in the calculated values. Examining the comparison chart of the index comparing the amount of temperature taken in different parts of the building with the outside temperature in section 1 of the sample building designed for Tehran also confirms the same situation so that the amount taken out in this way during the warmer months indicates the desired Being the quality of climate design.

Examination of the amount of input or output energy in sections two and three also shows similar results with section one, with the difference that in these two sections the absorbed temperatures are lower than in section one, and therefore the input and output. Energy is also less than part one, but in general, the pattern of decreasing the internal temperature of parts 2 and 3 in the warm months and maintaining the temperature in the cold mounths shows the favorable climate design suitable for window openings in the designed building. Examining the comparison diagrams of the comparison index of the temperature obtained in different parts of the building with the outside temperature in sections 2 and 3 of the sample building designed for Tehran shows the balanced distribution of inlet and outlet energy through the openings of these two sections. And the desired pattern is applicable.

Conclusion

In this study, in order to investigate the amount of energy received by the building through the temperature of radiant energy, hourly data of climatic parameters (humidity, minimum temperature, maximum temperature and sundial) have been used. Using Squre one software, Ecotect data analysis was performed. The amount of energy received by the building was calculated through the temperature obtained from radiant energy, and also the amount of energy received by the building through indirect radiation (absorption through walls and ceiling) was calculated. It was found that the results of the study of these calculations show that the peak energy is between 11-16 hours. This is the time when materials with a thermal delay of only 6-7 hours are used in the building. The amount of energy from solar radiation for the building (penetration through windows, entrance doors and openings) was calculated for all three parts of the sample building designed for Tehran. The section plays a very effective role in reducing the internal energy of the building and cooling the air inside the building. In section 1 of the building,

in the warmer months of the year, the increase in energy transfer is not so high due to the delayed transfer, which causes the house to overheat and provide the need for residents to use cooling systems for more hours, and vice versa during the months. Cold part of the energy is supplied through the transmission of building fibers and only the lack of energy is supplied through heating systems. The heat study related to section 2 of the design sample house also shows the same characteristics for transfer hours with heat transfer delay coefficient, with the difference that the amount of energy received in section one is less than section one in different hours, and this is the reason. To have more cooler hours in section 2 of the house during the hot months, but during the cold months to provide a little more energy than section 1, and calculate the amount of energy received through the walls and ceiling for section 3 of the sample house, while from In terms of peak hours and maximum transfer hours to the night, features similar to other parts prevail. In this section, the most important difference with the previous two sections is the low amount of energy absorption and transfer throughout the year compared to other parts of the building.

Keyword: Energy, Tehran, building, design, climate compatible

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