Design of a new heat-insulating solar roof in China

Does internal insulation reduce the heat loss of a roof?
The mathematical model and the energy balancing equations were established to clarify the theoretical basis and evaluated the effectiveness of the proposed method through experiments. The results indicate that the internal insulation helped reduce the heat loss of the front roof by 13.67%and the total heat saving in CSG was 8.75%.

Does external thermal insulation affect the microclimate environment of Chinese solar greenhouse?
In order to optimize the heat preservation capacity of Chinese solar greenhouse (CSG) and further reduce energy consumption,we clarified the mechanism of the external thermal insulation layer that affects the microclimate environment of CSG.

Can a single-layer front roof reduce heat dissipation in unheated CSG?
Since as much as 60% of the heat is lost from the front roof, a novel internal insulation was proposed to improve the thermal insulation capacity of the unheated CSG. The traditional single-layer front roof was transformed into comprehensive external and internal thermal insulation to reduce nighttime heat dissipation.

Can a single-layer roof insulation reduce heat loss in a greenhouse?
Therefore, it is necessary to reexamine the single-layer front roof insulation of the traditional unheated greenhouse, and search for an energy-saving design scheme for cleaner production. Some researchers have tried to use double-layer front roof insulation to reduce the heat loss in the greenhouse.

Does a two-stage thermal insulation system reduce heat loss through the south roof?
Effect of the two-stage internal thermal insulation system on heat loss through the south roof. The two-stage internal thermal insulation system can further improve the thermal insulation performance of the CSG. The nighttime air temperature was significantly improved after the internal thermal insulation system opened compared with no system.

Can internal insulation improve the thermal insulation of the front roof in CSG?
A novel internal insulation was proposed to strengthen the thermal insulation of the front roof in CSG for overwintering vegetable production. The reasonable configuration of TSO internal insulation was identified for popularization and application. The average temperature could be improved by 2.01 K in comparison with traditional CSG.

Since as much as 60% of the heat is lost from the front roof, a novel internal ...

In the passive house system in cold regions today, the strategies focus on reducing energy loss by enhancing the thermal insulation performance of the building"s envelope. Yet, under the specific background, the

application of passive house evaluation system lacks emphasis on the significance of solar heat gain. In this paper, two independent passive ...

To achieve indoor thermal comfort via natural ventilation, traditional buildings in South China"s Lingnan region have evolved distinct features tailored to the hot and humid climate conditions, involving site planning, function layout, and construction techniques. This study delves into the influences of these features on aspects such as sun-shading, ventilation, and heat ...

This paper proposed an innovative theory of designing the thermal insulation and heat storage of the CSG that divided into independent heat collection-release system, independent heat...

This paper clarified the mechanism of the south and north roofs" effect on the ...

On this basis, this study proposes a new passive heating design--that is, ...

At 16.00, the heat loss from the south roof was greatly reduced by covering it with the heat preservation quilt. At the same time, the maintenance structure and the soil had begun to release heat into the interior to counteract ...

The traditional single-layer front roof was transformed into comprehensive external and internal thermal insulation to reduce nighttime heat dissipation. The mathematical model and the energy balancing equations were established to clarify the theoretical basis and evaluated the effectiveness of the proposed method through experiments. The ...

On this basis, this study proposes a new passive heating design--that is, the traditional residential roof solar heat storage heating system--which combines the building roof with renewable energy. Firstly, the glass skylight is installed in a traditional residential roof to increase the indoor solar radiation range, and the HDPE thermal ...

In order to optimize the heat preservation capacity of Chinese solar greenhouse (CSG) and further reduce energy consumption, we clarified the mechanism of the external thermal insulation layer that affects the microclimate environment of CSG.

A new evaluation method is developed for both solar heating systems and solar PV. An adaptability index is developed considering the energy conservation, environment effect, and economy benefit of ...

where DN represents the number of days.T LOCAL and T STANDARD refer to the local apparent solar time and Beijing time, respectively. ? LOCAL and ? STANDARD refer to the local longitude and standard longitude of Beijing time, respectively. ET is the time difference between the local position and Beijing time.. 2.1.2 Solar radiation captured and transmitted by ...

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Generally, each exterior wall should be treated differently, using new technologies such as heat-insulating coatings and self-insulating walls; roof should be well insulated with underneath ventilation; and high performance exterior doors, windows, curtain walls and active external shading should be applied; in addition, considering the climatic differences, ...

This direct-normal C-IDHRhp indicator delineates the distribution of the solar ...

Solar reflective coating applied on roof/wall surface is becoming an important passive cooling technology for building energy efficiency. Shanghai is located in the climate of hot summer and cold winter, so the hybrid system of solar reflective coating combined with thermal insulation materials on roof/wall should be an efficient way for building energy saving.

This paper proposed an innovative theory of designing the thermal insulation and heat storage ...

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