국내 태양복사 분포 및 변화특성

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Distribution and Variation Characteristic of Solar Radiation Resources in Korea

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Solar energy is one of the most promising energy resources in the future. For the application and dissemination of solar energy technologies in various fields, reliable data sets of solar irradiation are needed for engineers, researchers, businessmen, and policy makers. Global horizontal solar radiation is needed for the use of flat plate collector, solar domestic hot water system, photovoltaic devices and passive systems like green house. In many countries, solar radiation data accumulated for more then 40 or 50 years and typical weather data are published with average of more then 30 years. In Korea, those global total radiations are measured for about 30 years. With the connections of computer network, measured data could be transmitted to the central control system at key station through Ethernet lines. The data acquisition systems are connected to be automatically controlled by the monitoring network. Global horizontal solar radiation data 16 locations were measured and averaged from 1982 to 2008.

Key words : 태양에너지 자원(Solar Radiation Energy Resource), 수평면 전일사량(Horizontal Global Insolation)

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수막재배 단동비닐하우스의 태양열 축열이용 효과분석

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Analysis of Solar Energy Storage Using Effectiveness on Single Span Plastic Greenhouse with Water Curtain System

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This study was carried out in order to reduce the amount of underground water which is used in the water curtain system for retaining heat. To proceed to the research, two plastic green houses of water curtain system were installed. One was equipped of internal small tunnel for keeping warm air in the interior of the house. Then the internal small tunnel for keeping warm air was fitted with PVC duct of 50cm in diameter filled with subsurface water. Storing surplus solar energy in the water filled in PVC duct was the method used to this house. Another was installed with FCU in the middle of the house, and was fitted a circulation motor in water tank for heat storage which was operated from 10 a.m. to 4 p.m. in order to interchange heat with FCU. The latter was installed with four FCUs which has a capacity of 8000kcal per hour. Consequently about 5 degrees celsius could be maintained in the interior of the internal small tunnel for keeping warm air with the external temperature of more than minus 5 degrees celsius. It appeared that the alteration of an internal temperature of the house was flexible depending on the sunlight during daytime. It happened that to prevent the water from freezing, mixing antifreezing liquid in the flowing water of FCU or changing the operating method of FCU was a suitable measure. Also, in order to use the surplus solar thermal energy on plastic green house of water curtain system efficiently, storing the surplus heat during daytime simultaneously finding a method of using water curtain systematic underground water happened to be important. As a result of this research, when the house's interior temperature is below zero the operation of FCU appeared to be impossible. Therefore when supposed that the amount of water used in the house is 150~200ton for stable operation of FCU, using the system mentioned in the above research happened to be appropriate of reducing the amount of subsurface water from 80% to 100% when maintaining the interior of internal small tunnel's temperature for keeping warm air of 5 degrees celsius at the extreme temperature of minus 5 degrees celsius.

Key words : Water curtain system(수막재배시스템), Surplus solar thermal energy(잉여 태양에너지), Plastic greenhouse (비닐하우스), Greenhouse keeping warm system(비닐하우스 보온시스템)

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