

ABSTRACT

Developing Databases of External Illuminance and Sky Luminance Distributions for Building Daylighting Designs

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For building daylighting designs, external illuminances and sky luminance distributions are necessary input data of computer simulations to predict daylighting performances of a building design. To the end, the analysis method of weather data should be standardized and external illuminance and sky luminance distributions have to be constructed to analyze weather conditions and to apply them to daylighting designs.

In this study, two computer programs were developed. A software engine which can easily generate TMY(the Typical Meteorological Year) of any region in Korea was developed. Also a computer program which calculates external illuminances and sky luminance distributions using Perez sky model and construct them as databases.

Then, TMY of the Seoul area was generated by the use of the developed software engine and databases of external illuminance and sky luminance distributions.

This thesis consists of a total of six chapters, and each chapter can be summarized

as follows:

In Chapter 1, the background and purpose of the study, the scope and methodology of the study were described.

In Chapter 2, the theories of TMY and Perez Sky Model were reviewed to standardize the preparation of weather data and to develop a computer program for the databases of external illuminances and sky luminance distributions.

In Chapter 3, the structure of the software engine for TMY and the computer model for external illuminances and sky luminance distributions were described.

In Chapter 4, the process of generating TMY for the Seoul area was described.

In Chapter 5, Perez's sky model was applied to develop the computer program for external illuminances and sky luminance distributions. Then, the databases of hourly external illuminances and sky luminance distributions for the Seoul area were constructed.

In Chapter 6, the conclusions of the study were stated.

The results of the study can be summarized as follows:

1. In this study, the software engine for TMY was developed.
2. Then, the software engine was used to generate the TMY for the Seoul area with the raw weather data set obtained from the Korean Meteorological Office.
3. The computer model for external illuminances and sky luminance distributions was developed by the Perez's sky model and databases of external illuminances and sky luminance distributions for the Seoul area were constructed.
4. In addition, the databases of external illuminance and sky luminance

distributions were displayed as tables and graphs.