Chapter 3

A REVIEW STUDY ON EMPIRICAL MODELS FOR THE ESTIMATION OF GLOBAL SOLAR RADIATION

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INTRODUCTION

The rapid increase in energy demand in the world has increased the search for the use of new energy resources. Most of the energy demand in the world today is fulfilled from fossil energy sources. Greenhouse gases caused by fossil energy sources and global warming lead people to alternative sources. For these reasons, the use of renewable energy sources is becoming widespread. Among the renewable energy sources, solar energy is the most important source. Solar energy can be used to produce hot water and hot air as well as electricity production.

Meteorological measurements must be made before the installation of solar power plants. However, it is not possible to establish meteorological measuring stations for all coordinates on earth. Therefore, solar energy estimates are made using mathematical equations and forecasting models. The solar radiation reaching from the sun outside the atmosphere can be calculated using various equations. As a result of this calculation, a clear and accurate value can be reached. Because the number of factors affecting solar radiation outside the atmosphere is not too much.

However, it is not possible to calculate the amount of radiation that reaches the surface of the atmosphere. Because the radiation reaching the surface from the atmosphere can be affected by many factors such as cloudiness, air humidity, topographic structure and vegetation. Therefore, the global solar radiation value is determined by estimation, not calculation. Since the value of global solar radiation is influenced by many factors depending on geographic location and structure, there are models developed for different regions. Using these models, researchers calculate the model constants appropriate to their geographic location.

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