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Autore	Walker Andy (Howard Andy)
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of Intermittent Solar Energy Sources on the Utility System; Utility Regulatory Policy; Net Metering; Predicting and Achieving Utility Cost Savings (Performance Simulation); Optimizing the Size of a Solar System; OPTIMIZATION USING CALCULUS (DERIVATIVE EQUAL TO ZERO) Example Calculation of Optimal Solar System Size Strategies for Maximizing Integration of Solar Energy with Conventional Utilities; Example of Solar Storage; Microgrids; REFERENCES; 2 The Solar Energy Resource; STRUCTURE OF THE SUN; Core; Radiative Zone; Convection Zone; Photosphere; Outer Layers; NUCLEAR FUSION: THE SOURCE OF THE SUN'S POWER; THE SPECTRAL NATURE OF SOLAR RADIATION; Wavelength and Frequency; Energy of a Photon; ASTM Standard Solar Spectrum; POSITION OF THE SUN IN THE SKY; Time-of-Year: Declination and the Seasons; Time-of-Day: Standard Time, Solar Time, and the Hour Angle
Solar Altitude Angle, (degrees)DIRECT BEAM, DIFFUSE, AND GLOBAL SOLAR INSOLATION IN THE PLANE OF A SOLAR COLLECTOR SURFACE; Solar Constant; Direct Normal Insolation, Ibeam I (W/m2, Btu/hr/ft2); Diffuse Solar Insolation, Idiffuse I (W/m2, Btu/hr/ft2); Ground Reflected Radiation, I ground reflected I (W/m2, Btu/hr/ft2); Global Solar Radiation in the Plane of a Solar Collector Surface; INCIDENT ANGLE OF DIRECT BEAM SUN ON A SURFACE; Horizontal Surface; Vertical Walls; Fixed Tilt; Horizontal East-West Axis Tracking the Altitude of the Sun Horizontal North-South Axis Tracking the Azimuth of the Sun Tilted Axis Tracking the Azimuth of the Sun; Two-Axis Tracker; Example Calculation of Solar Insolation Incident on a Surface; THE EFFECT OF SHADE; Example Calculation: Spacing Rows of Collectors to Avoid Shading; SOLAR RESOURCE MEASUREMENT; SOLAR RESOURCE MAPS AND DATA; TYPICAL METEOROLOGICAL YEAR (TMY) WEATHER DATA; FORECASTING THE SOLAR RESOURCE HOURS OR DAYS INTO THE FUTURE; Conventional Weather Forecasting; Sky Imaging; Numerical Weather Prediction; DIAGNOSIS OF SOLAR ENERGY SYSTEM PERFORMANCE USING SOLAR RESOURCE DATA
COMPUTER TOOLS FOR ANALYSIS OF SOLAR POSITION AND SOLAR RESOURCES

Sommario/riassunto

Solar Energy is an authoritative reference on the design of solar energy systems in building projects, with applications, operating principles, and simple tools for the construction, engineering, and design professional. The book simplifies the solar design and engineering process, providing sample documentation and special tools that provide all the information needed for the complete design of a solar energy system for buildings to enable mainstream MEP and design firms, and not just solar energy specialists, to meet the growing demand for solar energy systems in building projects.