

96/00611 20th National Passive Solar Conference Proceedings

Campbell-Howe, R. and Wilkins-Cowder, B. (eds.) *American Solar Energy Society, 2400 Central Ave., Suite G-1, Boulder, CO.80301, USA, \$100.00, 339 pp.*

96/00612 Thermal performance of a simple design solar air heater with built-in thermal energy storage system

Fath, H. E. *Energy Convers. Mgmt.*, Oct. 1995, 36, (10), 989-997.
The thermal performance of a simple design solar air heater is presented. The conventional flat plate absorber is replaced by a set of tubes filled with a thermal energy storage material. The proposed integrated system heat transfer area and heat transfer coefficient are increased, and the heat loss is reduced. Based on a simple transient analysis, explicit expressions for the heater absorber and glass cover temperatures, effective heat gained, outlet air temperature, and the heater efficiency have been developed as a function of time. The integrated system performance curves are presented, and marked improvement on the system performance is noticed over the conventional flat plate heater system.

96/00613 Two-stage solar collectors approaching maximal concentration

Mills, D. R. *Solar Energy*, Jan. 1995, 54, (1), 41-47.
Maximally concentrating collectors include the class of ideal concentrating collectors, but are a more general class offering many more practical possibilities. By evaluating such configurations using the concept of maximal flux concentration, based upon average radiation flux concentration over the acceptance angle, clear ray trace comparisons may be made between different collector configurations. These comparisons allow the most effective configuration to be selected for a given application. An example of comparatively simple and practical two-stage concentrator having equal or better maximal performance than previous work for high rim angle primaries is given.

96/00614 Typical solar radiation data for Oman

Al-Hinai, H. A. and Al-Alawi, S. M. *Applied Energy*, 1995, 52, (2), 153-163.
The monthly averaged daily global solar radiation is calculated using daily data of global solar radiation obtained by measurements of six weather stations at different locations in Oman over a period of 6 years. The clearness index for a typical day (at midday) of each month is then estimated for each location. Also, the hourly values of different components of solar radiation (direct, diffuse and global) over these six stations are estimated for a typical day of each month by applying empirical models and using the standard meteorological data for each station.

96/00615 Yearly distributed insolation model and optimum design of a two dimensional compound parabolic concentrator

Suzuki, A. and Kobayashi, S. *Solar Energy*, May 1995, 54, (5), 327-331.
Optimum acceptance angle of a compound parabolic concentrator is studied by the use of an insolation model proposed in this paper.

96/00616 Yield of solar stills with porous basins

Madani, A. A. and Zaki, G. M. *Applied Energy*, 1995, 52, (2), 273-281.
Following a brief review on the recent trends for improving the economy of direct solar distillation, a new simple still is described. In the proposed conceptual design the construction cost is greatly reduced by eliminating the concrete structure for the still's basin and the black lining materials. Instead a site is filled with powdered soot obtained free of charge from oil-fired power plants. The effects of the powder and the basin's insulation layer on the yield from the solar still are examined experimentally.

Tidal/Wave Energy

96/00617 Osprey launched... then sinks

Energy World, Sep. 1995, (231), p. 11.
A short report on the wave energy machine, Osprey - Ocean Swell Powered Renewable Energy, which sank again, off the north coast of Scotland, following damage to two of its nine ballast tanks.

96/00618 Requirements for a tidal power demonstration scheme

Young, R. M. *Proc. Int. Conf. Power Generation & the Environment, I Mech. E., Jun. 1994, 219-227.*
The author argues that if it is decided to progress with the UK's tidal power programme, the next logical step will be to build a demonstration scheme. Sets out criteria for selecting a suitable demonstration scheme site and identifies a number of candidates.

Wind Energy

96/00619 Adaptive strategies using standard and mixed finite elements for wind field adjustment

Winter, G. *et al.*, *Solar Energy*, Jan. 1995, 54, (1), 49-56.
In order to find a map of wind velocities, this study tries to obtain an incompressible wind field that adjusts to an experimental one: also verifying the corresponding boundary conditions of physical interest. This problem has been solved by several authors using finite differences or standard finite element techniques. In this paper, this problem is solved by two different adaptive finite element methods.

96/00620 Applying H-infinity and control methods to wind turbines using MATLAB

Kunda, N. and Crane, C. M. *Int. J. Amb. Energy*, Jul. 1995, 16, (3), 131-138.
The application of robust multivariable control system design methods to wind turbines is discussed.

96/00621 Design criteria for passive pitch control of wind turbines using self-twisting blades

Infield, D. and Feuchtwang, J. B. *Int. J. Amb. Energy*, Jul. 1995, 16, (3), 139-146.
The authors describe how a simple model of blade twisting was used in conjunction with a wind turbine rotor performance model to predict the ability of a self-twisting blade to regulate the speed of a small wind turbine. The aim of the project is to develop a small wind turbine with improved reliability by achieving speed control of the turbine with no moving parts apart from the rotor itself and the yaw bearing.

96/00622 Dynamics and control of isolated wind-diesel power systems

Bhatti, T. S. *et al.*, *Int. J. Energy Res.*, Nov. 1995, 19, (8), 729-740.
In this paper a comparative dynamic stability study has been carried out for wind-diesel systems with multiplicity of generation. The mathematical model considered for dynamic stability evaluation is based on small signal analysis. The Lyapunov technique is used to evaluate the optimum setting of gain parameters and comparison is made with the values given in the literature. Additionally the diesel unit equipped with a supplementary proportional integral controller is also considered and its effect on the dynamic stability of the system is investigated.

96/00623 Maximum power tracking for a wind driven induction generator connected to a utility network

Shaltout, A. A. and El-Ramahi, A. F. *Applied Energy*, 1995, 52, (2), 243-253.
The paper proposes a simple control strategy that is applied to a grid connected wind driven system to facilitate harnessing maximum power. The principles of this strategy are demonstrated in a system which comprises a double-output induction generator driven by a variable-speed wind turbine. This strategy is based on controlling the slip power, which is extracted from the rotor circuits and fed to the grid through a rectifier/inverter branch. The firing angle of the inverter is used to control the slip power and, hence, the operating point. A mathematical model is presented to analyse the behaviour of the system and to demonstrate the capability of the proposed control strategy. An experiment has been conducted to verify the validity of the control strategy and the calculation methodology.

96/00624 Not as cheap as wind (Letter)

Swift-Hook, D. T. *Energy World*, Oct. 1995, (232), p. 22.
A reply to the letter written by John Bindon (*Energy World*, September 1995, Readers' Letters) on wind energy.

96/00625 Synthesis of long-term hourly wind speed time series on the basis of European Wind Atlas data

Beyer, H. G. and Nottebaum, K. *Solar Energy*, May 1995, 54, (5), 351-355.
A method for the synthesis of annual wind speed time series with a time resolution of 1 hour is presented. It is based upon statistical information on the wind climate given in the European Wind Atlas. The synthetic time series reproduce the monthly average daily time pattern of the site. The distribution of the synthetic wind speed data shows the correct mean value of the cubed wind speed. The site-specific variance of the wind speed and the power spectrum of the wind speed fluctuations are closely approximated. Results of time step simulations for small stand-alone wind energy systems using synthetic and measured data sets as input data show a close agreement.

96/00626 Wind energy's declining costs

Gipe, P. *Solar Today*, Nov.-Dec. 1995, 9, (6), 22-25.
Discusses the cost of wind energy in the USA.