GÜNEŞ ENERJİSİNİN YEREL YÖNETİMLER TARAFINDAN UYGULANMASI VE ÇARPAN ETKİSİ

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ABSTRACT

Utilization of Solar Power By Local Administrations and The Multiplier Effect

Industrial revolution which is acknowledged as a milestone in production has accelerated energy consumption and the rising competition has reached to a level which harms the environment and human beings. Human beings have reached to the current status by utilization of underground energy sources. Modern technology and new techniques made access to energy sources easier. On the other hand, demand to energy sources has increased significantly. Various interrelated factors caused vital problems, such as climate changes, global warming, extinction of some species or endangered species threaten the future of the earth. In order to get rid of those problems and leave a more livable earth to the future generations, utilization of renewable energy sources has become an obligation. This obligation, following the logic of "The environment can exist without human beings but human beings cannot exist without the environment" forced the administrations to solve the problems and to increase the efforts for this purpose.

Following the stated situation, in our study first chapter will cover the concept of energy and solar energy which is one of the most important renewable energy sources on the earth. In the following chapters, clean energy , policy development and renewable energy policies and new applications of the Selcuklu Municipality's which follows innovations closely will be covered in details and based on the achieved data the multiplier effect on municipalities in Turkey will be analyzed. At the end, the evaluation of the study will be made and some suggestions and predictions will be presented.

Keywords: renewable energy, solar energy, local administrations

GÜNEŞ HAVUZU TABAKALARININ TERMODİNAMİK ANALİZİ

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ABSTRACT

Thermodynamic analysis of a solar pond layers

For the evaluation and improvement of the thermal energy storage system as a solar pond, it is essential to understand the sources of useful energy losses and the interactions among system components. The performance analysis of a solar pond is related to a set of the operating parameters such as solar radiation flux, environment temperature, surface area and depth of the solar pond. By means of exergy analysis, we know that a high percentage of the useful energy of solar radiation is lost in the solar pond system. The paper presents an investigation and study on the effects of the solar pond layers for the exergy loss in the solar pond. Finally, a case study is also presented for the energy and energy efficiency, exergy and exergy efficiency analysis for the solar pond layers.

Keywords: *solar pond, thermodynamic analysis, efficiency.*

FAZ DEĞİŞİMLİ ISI DEPOLAMA MADDESİ OLARAK PARAFİNİN ISIL İLETKENLİĞİNİN ZENGİNLEŞTİRİLMESİ

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ABSTRACT

Investigation of Melting Behavior in a Porous Media Filled With Paraffin as Phase Change Material

Phase change materials (PCMs) have received greater attention by researchers in the recent years because of their large heat storage capacity and their isothermal behavior during the charging and discharging processes. The most important issue to be addressed in PCMs is beside the high energy storage density have an unacceptably low thermal conductivity. Therefore, heat transfer enhancement techniques are required for any latent heat storage (LHTS) applications.

In this study, the change of the paraffin's (n-heptacosane, melting point 59-61 ^{O}C) ,used as a phase change material, heat transfer characteristics with different heating surface position and supplement of the open porous metal foam was experimentally investigated. The heat storage medium in the form of a rectangular cube, has a total volume of 273 cm^3, and was made of plexiglass. Experiments were performed by applying three different heat fluxes respectively bottom, side and top surfaces and the effect of melting behavior was investigated according to different position of the heating surface. In addition to this, the open porous metal foam supplemented in the PCM and aimed to improve the heat transfer performance. Results obtained from the experiments have been showed that depending on the heating position and surface heat flux, the effect of natural convection significantly increased in the liquid phase PCM.

Keywords: thermal energy storage, phase change material, paraffin, metal foam

Optical study of a new sun-pointing sensor detector for a sun tracking system applied to parabolic trough collectors

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ABSTRACT
Optical study of a new sun-pointing sensor detector for a sun tracking system applied to parabolic trough collectors
Generally there are two types of solar tracking, blind and sensitive; the sensitive solar tracking system is based on the sun-pointing sensor detector. In this work we will study a proposal of a new sun-pointing sensor detector, In order to have a sun tracking device, who tracking the sun with reliability and accuracy throughout the year in an optimal way. Before starting the phase of realization, it is important to have an idea about the behavior of the proposed detector, for that we started with a detector design using SolidWorks, after that we have introduced the designed detector in optical simulation software 'TracePro'. The obtained results have shown that the proposed detector is reliable, with few problems during system startup in the winter where we have proposed some solutions.
Keywords: *sun-pointing sensor detector; Sun tracking system; Simulation software TracePro.*

FAZ DEĞİŞTİREN MADDE İÇEREN BİNA GÜNEY DUVARININ DENEYSEL OLARAK İNCELENMESİ

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ABSTRACT

An Experimental Investigation of The South Wall of The The Building Integrated With Phase Change Material

This study, the annual performance of a new generation Trombe wall in which solar energy is stored as latent heat is experimentally investigated. For this purpose, a test room is built and the south wall of a test room is designed as Trombe wall having Phase Change Material (i.e., PCM wall). Data such as solar radiation, temperature, flow rate of circulation air, electric consumption are measured and recorded via data acquisition system to analyses the thermal and optical performance of the PCM wall. After analyzing the experimental data, proper melting temperature for the PCM is determined, the diurnal, monthly and annual variation of the performance parameters such as, the ratio of the solar energy benefit to heat load of the room, overall efficiency of the wall, solar transmittance of the TIM are analyzed. The ratio of energy benefit of PCM wall to heat load of test room is determined as 70,4%, 40,8%, and 14,2% for October, November and December of the year 2008, respectively and 9,4%, 11,3% and 4,3% for January, February and March of the year 2009, respectively. The overall efficiency of the GR35 PCM wall is higher than that of GR41 PCM wall. It is concluded that higher melting temperature of PCM results in lower overall efficiency.

Keywords: *passive solar heating, transparent insulation materials (TIM), PCM Trombe wall, building envelope*

SÜRDÜRÜLEBİLİR SERALARDA GÜNEŞ ENERJİSİ, RÜZGÂR TÜRBİNİ VE ISI POMPASI MELEZ UYGULAMASININ ENİYİLEMESİ

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Optimization of Hybrid Solar, Wind, and Heat Pump Application in Sustainable Greenhouses

ABSTRACT
Recently irrigation-based small farmers are faced with several difficulties. For example, a creditor bank may pound the irrigation pump of the farmer against debts; tractors may be seized against utility bills. Having lost his farming capabilities these small farmers become even poorer and cannot farm any more. This makes it necessary to sell their land to large international corporates who are supported by a government program named land integration program, which has unclear and debatable real objectives in the background. Farmers having lost their land become consumers rather than producers. Large farms often tend to use more synthetic fertilizers and genetically modified seeds etc in the name of more production. This also holds true for large-scale mechanization that transforms into more green-house gases. These activities also destroy the original vegetation culture and increase the national dependence on foreign countries and their capital. The latest example is the Ayaş tomato, which seems to be extinct. It was a highly demanded type of tomato. Struggling small farmers who have the courage to resist this movement tend to expect a solution from renewable energy resources with great hopes. However high investment costs and the scarcity of financial support, their efforts most often end up with disappointment. This research aims to develop renewable energy-based hybrid green houses to be added to the ordinary farm life, which will generate high value added greenhouse products in order to generate the necessary capital for the farmer sand support their main farming activities. This will also enhance the revival of the original vegetation culture and lead to organic green housing that is prone to special attention of the farmer. In this respect, a new design and control optimization algorithm has been developed. The new greenhouse design utilizes ground heat, wind and solar energy and employs systems like the newly-developed PHVT (Solar Heat-Voltaic and Thermal) cells, ground-source heat pump, and wind turbine. Besides these, energy storage systems are also employed. Analyses were carried out by the Rational Exergy Management Model with the objective of maximizing the efficiency. Sample studies show that a hybrid greenhouse system with an optimum bundling of renewable energy resources and systems may be a viable solution for small farmers.

Keywords: *Photo-Heat Voltaic and Thermal (PHVT) solar cell, sustainable hybrid energy systems, wind energy, sustainable greenhouse, solar energy, heat pump, small farm cooperatives, heat and power cogeneration, Rational Exergy Management Efficiency*

LİNEER FRESNEL KONSANTRE GÜNEŞ ENERJİSİ SİSTEMLERİNİN TASARIMI VE TERMİK SANTRALLERDE UYGULANMASI

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Abstract
In this study; becoming hybrid system, reducing the environmental impacts of fossil fuel-fired thermal reactors, extension life of the thermal reactors and in order to contribute the economy of Turkey, with the existing Concentrated Solar Power Systems in the world are investigated. Examining currently operated solar power systems; each of Concentrated Solar Power Systems advantages – disadvantages have been written, given examples and Fresnel Solar Power System design, which is designed in an original way described. In the conclusion, thermal reactors and Concentrated Solar Power Systems co-operation established by hybridization, advantages for examined.
Keywords: *Concentrated Solar Power, Thermal Reactor, Linear Fresnel Solar Power System*

TÜRKİYE'DE YENİLENEBİLİR ENERJİ KAYNAKLARINDAN GÜNEŞ ENERJİSİ POTANSİYELİ VE KULLANIMI

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ABSRACT

Solar Energy Potential in Turkey and Use of Renewable Energy Resources

The increasing problems associated with environmental pollution, especially the importance of renewable energy sources has increased and started to support projects related to them. According to estimates, by 2025, about 10-15% of the total electricity produced in the world much of a part of the renewable / alternative energy sources will be covered.

Renewable / Alternative energy sources in Turkey, what is the use of solar energy? What kind of studies and projects are carried out? Is it okay to use solar energy in Turkey, Does it have enough potential? Published technical articles and statistics based on a study carried out by giving results are discussed here

Keywords: Renewable Energy, Solar Energy, Solar Energy Potential in Turkey

YOĞUNLAŞTIRILMIŞ GÜNEŞ ENERJİSİ GÜÇ SİSTEMLERİ İÇİN TEKNOLOJİ YOL HARİTASI

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ABSTRACT

Technology Roadmap for Concentrated Solar Power Systems

Concentrating solar power (CSP) systems which directly uses environmentally solar energy, has emerged as a promising technology for electricity generation. CSP plants produce electricity in a similar way to conventional power stations; however, the difference is that CSP plants obtain their energy input by concentrating solar radiation and converting it to high temperature steam or gas to drive a turbine.

The present study was conducted to find out the development trends of the scientific studies in the field of concentrated solar power system in the World. All documents used in this study were accessed from the database of the Science Citation Index (SCI), obtained by subscription from the ISI, Web of Science and EPO. To shed light on CSP trends and contributions, both a bibliometric analysis and a historical review were conducted in this research. For the bibliometric analysis, the SCI was systematically searched for CSP related materials published from 1991 to 2012. Selected documents included "concentrated solar power" in the topic. On the other hand, the patent data used in this study was extracted from the patent databases of the global patent index of esp@cenet. Same keywords as in bibliometric search were used to identify relevant patent disclosures in the databases.

Analyzed parameters included number of article and patent, authorship and ownership, patterns of international collaboration, address, number of times cited. A historical review was also performed. For a longitudinal literature review, we employed bibliometric and historical review methods to explore CSP technological trends, and based on this review, we forecast possible future developments.

Keywords: *concentrated solar power, bibliometric analysis, patent analysis, technology foresight, technology road map*

Second law experimental analysis of box type solar cooker

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ABSTRACT

This investigation is emphasizing the importance of second law analysis to assess the thermal performances of solar cookers. The efficiency of box type solar cooker (BSC) was evaluated using exergy approach. The first box type solar cooker with inclined aperture area was designed, realized and experimentally tested in Applied Research Unit on Renewable Energies of Ghardaîa. The experiments have been carried out with the cooker filled with one liter of water from 09:00 to 16:00 local time for three days on May month under climatic conditions of Ghardaîa (32.39°N, 3.78°E, 463m). One/two reflectors (booster mirrors) were added to the cooker during execution in order to investigate their effect on overall performance.

It was found that the mean daily water temperature difference from 09:00 to 14:00 local time was 48.21, 54.71 and 56.11 °C for the three days of tests in the BSC. The exergy output of the realized cooker was only 3.96 kJ without reflectors (May 26th test), 4.80 kJ when adding one reflector (May 29th test), and it was 4.94 kJ for two reflectors adding (May 30th test). Whereas, it was found that the mean daily exergy efficiency of the BSC was 0.14, 0.18 and 0.19% without, with one and with two reflectors, respectively; during the same experimental tests period.

Keywords: Solar radiation, Box type solar cooker, Exergy efficiency, Thermal performance, Food cooking.

ANALYSIS WITH COMPUTER PROGRAM OF SOLAR ABSORPTION COOLING SYSTEM

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ABSTRACT

In this study, thermodynamic analysis of solar absorption cooling system for İzmir was carried out. LiBr-H_2O solution was used. Thermodynamic analysis was made by using EES (Engineering Equation Solver) program. Pressure, temperature, mass flow rate, LiBr concentration, entropy and exergy values for each point of system were obtained. In addition, solar radiation and solar collector computations were made.

Key words: *solar, absorption, EES, cooling systems*

GÜNEŞ ENERJİSİ İLE ÇALIŞAN TAKSİ

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Özet:

Üzerinde çalışma yaptığımız projenin amacı öncelikle ülkemizin büyük bir sorunu olan trafik kaynaklı çevre kirliliğinin önüne geçmekir. Bu çalışma boyunca temiz enerjilerden güneş enerjisi seçilmiştir. Proje konusu olan güneş enejili taksi, bir bireyin bir konumdan diğerine pratik ve ekonomik olarak ulaşımını sağlamayı toplu taşıma aracı olarak hedeflemektedir.

Proje çalışması boyunca verimli bir güneş enerjili taksinin sahip olması gereken özellikler üzerinde çalışılmıştır. Bunların başında kabuk yapıları, elektronik yapıları ve mekanik yapıları gelmektedir.

Otomobil verimini düşüren ana etkenler olan hava ve mekanik parçalardan kaynaklı sürtünmelerin en aza indirilmesi için özel parçalar ve geometriler oluşturulmuştur. Elektronik verimin en yükseğe çıkarılması için özel meteryaller seçilmelidir.

ATIK ISININ ORGANİK RANKİNE ÇEVRİMİ İLE KULLANILABİLİRLİĞİ VE EKSERJİSİ

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ABSTRACT

Usability of Waste Heat by Organic Rankine Cycle and Exergy Analysis

The Organic Rankine Cycle (ORC) is a technology that utilizes waste heat at low and medium temperature levels starting from 90°C in order to produce electrical power. Therefore ORCs can be powered by low temperature heat sources like exhaust gases and geothermal energy. Worldwide and specifically in Turkey ORC systems are used for geothermal sourced heat treatment systems. But facing problems like global warming and environmental degradation, ORC processes can be used to increase the overall cycle efficiency of any existing facility or process, utilizing formerly unused heat in electrical power. This study, analysis the potential of a steel and iron factory's hot stack gas for electricity generation using an ORC. The thermodynamic analysis of the system was performed using EBSILON®Professional (EBSILON), simulation software developed by Steag GmbH. The energetic and exergetic evaluations were both covered by EBSILON using the comprised Refprop fluid library. The result clearly showed that producing almost 410 kW net powers from nearly 1970 kW available heat is possible. The system payback period was estimated to be almost 5,5 years.

Keywords: *Waste Heat Treatment Systems, Organic Rankine Cycle, Exergy, Steel and Iron, EBSILON® Professional software*

POTASYUM KLORÜRLÜ GÜNEŞ HAVUZUNUN PERFORMANSININ İNCELENMESİ

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ABSTRACT

Performance Investigation of a Potassium Chloride Solar Pond

A solar pond is a body of water that collects and stores solar energy for a long time in its storage zone. Solar energy warms the water but it loses its heat unless it is trapped through some methods. The convection heat losses in the solar pond is prevented by salt gradient layers. A potassium chloride solar pond (PCSP) is used in this study. PCSP system with a radius of 0.96 m and a depth of 1.10 m was built in Cukurova University. The solar pond was filled by using potassium chloride solution. Thermocouples were used to obtain the temperature measurements in the solar pond. The density and the temperature distribution profiles were obtained from August to November. As a result, the heat storage performance of the solar pond is found to be maximum 27.90% in August and to be minimum 11.42% in November, respectively.

Keywords: *Solar energy, potassium chloride solar pond, thermal energy storage, heat transfer*

SODYUM KLORÜR VE MAGNEZYUM KLORÜRLÜ GÜNEŞ HAVUZLARINDA SICAKLIK VE YOĞUNLUK DAĞILIMLARININ KARŞILAŞTIRILMASI

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ABSTRACT

Comparision of the Temperature and Density Distributions in the Solar Pond with Sodium Chloride and Magnesium Chloride

Solar energy is becoming more important with each passing day for our country and our region. Solar energy systems are enhanced with technological developments, economically. Solar pond is a system which solar energy is collected and stored as thermal energy. Solar ponds typically are composed by using sodium chloride brine solution. In this study, solar ponds were constructed by using two different salt (NaCl and $MgCl_2$). Temperature sensors and hydrometers were used to measure the temperature and density of the inner zones of the solar ponds. The inner zones' temperature was recorded the hourly by a data acquisition system. However, the density of the inner zones was measured by using the pipes, manually. Both the density and the temperature distribution profiles were obtained from August to November. As a result, the temperatures of the solar ponds prepared using magnesium chloride and sodium chloride are found to be maximum 52.42 °C and 41.87 °C in August, and to be minimum 24.46 °C and 24.08 ° C in November, respectively.

Keywords: *Solar energy, solar ponds, thermal energy, temperature and density distributions*

DİFÜZYONLU ABSORPSİYONLU MİNİ SOĞUTUCULARDA NANO BOYUTTA METAL OKSİTLER İÇEREN SOĞUTUCU AKIŞKAN KULLANIMININ PERFORMANSA ETKİSİ

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ABSTRACT

The Effect Of The Use Of Cooling Fluid Containing Nano-Sized Metal Oxides On Performance In Mini Diffusion Absorption Coolers

This study investigates the effect of the passive heat transfer improvement method of adding nano-sized metallic particles with high thermal conductivity to the ammonia/water cooling/absorption fluid couple used in mini diffusion/absorption coolers on the heat performance of the system. The basic physical phenomenon causing a considerable improvement in heat transfer by nano-particle addition is the increase in surface area and heat capacity of the fluid through the addition of these particles. In addition, the addition of particles increases agitation and the rigor of turbulence dispersing the nano particles straightening the horizontal thermal gradient. For this purpose, Al_2O_3 metal oxide particles of a range of different sizes were added to cooling/absorption fluid mixtures with different ratios and its effect on system performance were investigated. The experimentally observed results indicated that the heat provided by the generator was better absorbed by the nano-particle added system and that the evaporation of the cooler evaporated faster away from the cooling/absorption fluid. The effect of the nano-particles on the connection units of the heat transfer in the system was observed. Shorter heat transfer periods reduced the operation time of the system, allowing faster arrival to the desired temperature thus facilitating energy savings.

Keywords: diffusion, absorption, mini cooler, nano particle ,ammonia/water

SOĞUTMA KULELİ ISI POMPASI SİSTEMİNİN TERMODİNAMİK ANALİZİ

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ABSTRACT

Thermodynamic analysis of a heat pump system with cooling tower

In this paper, energy and exergy modeling of the ground source heat pump integrated with the cooling tower for improving the performance of the whole system are given according to the First and Second Laws of Thermodynamics, respectively. The coefficients of performance as related to the energy and exergy terms are evaluated for investigation of the improvement potential of the combined ground source heat pump system. From the results, exergy efficiency, COP_{sys} and COP_{ex} of the combined ground source heat pump system are found as 74.72%, 2.895% and 0.39%, respectively. Also, parametric study for the integrated ground source heat pump system is conducted by the change in a design parameter, as variation of the ambient temperature ranges of 0 °C to 30 °C.

Keywords: *ground source heat pump, thermodynamic analysis, cooling tower.*

A CFD Based 2-D Validation Study of the Dynamics of a Semi-submerged Sphere in Heave Motion

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ABSTRACT

A CFD Based 2-D Validation Study of the Dynamics of a Semi-submerged Sphere in Heave Motion

A study that ultimately aims to take a step towards building the basis for investigation of maximized wave energy capture with non-linear boundary conditions is presented. In this paper, analytical validations for 2-D CFD simulations of a semi-submerged spherical buoy in heave motion is discussed. The analytical validations are based on well-known linear theory of wave body interactions. For this purpose, extensive CFD simulations were conducted at various disturbance levels of wave amplitudes and wave frequencies where linear theory is applicable. The water depths during simulations were kept large enough in order to justify the buoy dynamics for linear conditions. Buoy motion for both unconstrained and constrained oscillatory conditions were also simulated to understand the impact of energy capture and associated dynamics. CFD simulations based on non-linear boundary conditions have shown to have satisfactory agreement with analytical results. The validations specifically improved at larger water depth and smaller wave steepness.

Keywords: Computational Fluid Dynamics (CFD), linear wave theory, semi-submerged sphere, analytical validation

THE PERFORMANCE ANALYSIS OF WRF ON GHI PREDICTION IN TWO DIFFERENT REGIONS OF TURKEY

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ABSTRACT

The Performance Analysis of WRF on GHI Prediction in Two Different Regions of Turkey

The aim of this study is to 72 hour forecast of hourly global horizontal irradiation (GHI) using WRF model and to analyze the effect of parameterization on model performance for the two different periods including clear sky and cloudy conditions. Particularly, GHI forecast evaluation was carried out for the periods of August 20-23, 2011 as clear sky condition and May 8-11, 2011 as partly cloudy condition.

Performance of the WRF model using different radiation, microphysics and boundary layer parameterization configurations was verified against ground observations.

Keywords: WRF, GHI, Solar Radiation Prediction

EĞİTİM AMAÇLI MİNİ GÜNEŞ TAKİP VE ELEKTRİK ENERJİSİ ÜRETİMİ UYGULAMASI

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ABSTRACT

Miniature Solar Tracking and Electric Energy Production Application for Education Purpose

Our country and especially Konya region has reached to a level where renewable energy (and alternative energy) studies can easily become widespread due to the solar energy potential of the region, ease of operation and increase in energy requirement and costs. These days, the support of government incentives related with this subject constitutes the conditions necessary for efficient and prevalent usage of solar and wind energy. Considering our energy requirements and costs a prototype converting solar power into electricity and storing in accumulators was designed and realized in the name of value and efficient usage of energy and consciousness. If this application that may raise awareness about renewable energy (which was at the same time realized as simple, light and cheap) can become widespread in schools, it will support the young minds to become conscious.

In this study, design and application of solar tracking system with micro controller that will increase the daytime energy production capacities of solar panels was realized. The system was designed to track the movement of the sun in order to adjust the panel so as to allow sun lights to approach to the panel with a perpendicular angle for maximum insolation. The system is composed of bilateral mechanic system and electronic circuits.

Keywords: solar monitoring system, solar power, solar panels