

Potential of utilizing solar cooling in the University of Jordan

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In this paper, the potential of utilizing a solar cooling system to improve the indoor air quality is investigated. The analysis is performed for a 41 m² with a 3.65 m height laboratory located at Mango Center for Scientific Research – University of Jordan in Amman. The hourly ambient temperatures and the monthly solar radiation in Amman are recorded. The calculations of the cooling demand were done using two methods, i.e. manual calculations and block load software. For the analysis, the internal loads of lightning, computer, etc. and the building envelope (e.g. double glass, no shading) were considered.

The results show that proposed solar collectors of 40 m² area can provide solar heat for an 8 kW solar air-conditioning system. Moreover, domestic hot water (solar fraction up to 100%) and solar heating (approx. 15–25% solar fraction) could be also provided, with the solar air-conditioning system, for the centre. An economic study was also carried, which showed that the estimated payback period of the solar cooling system, exceeds that of project life time of the project, which is assumed to be 24 years unless the government of Jordan issues a new law for renewable energy that grants incentives, exemptions and subsidizes projects that invest in solar energy applications by about 40% of initial investment cost of the system.

Biography

A. Al-Salaymeh is Director of Water, Energy and Environment Center at the University of Jordan. He is Professor at the Mechanical Engineering Department, Faculty of Engineering and Technology, University of Jordan, Amman-Jordan. He received Ph.D. degree from the Institute of Fluid Mechanics, Friedrich Alexander Universiti Erlangen-Nurnberg, Erlangen-Germany in April 2001 and M.Sc. and B.Sc. degrees with honor from Mechanical Engineering Department at the University of Jordan. He has special interest in Fluid Mechanics, Turbulence Flow, Two-Phase Flow, MEMS, Micro pumps, Energy, Energy Efficiency, Renewable Energy such as Solar Energy, Wind Energy and Biomass. Also, Prof. Al-Salaymeh has a good research in the area of thermal flow sensors (Patent registered in Germany), Flow-Measurement Techniques such as Hot-Wire Anemometer (HWA) and Laser-Doppler Anemometer (LDA), and Turbulence Phenomena. He has Published many papers in the international Journals and an active in participating in many scientific conferences. Currently, he is an assessor for Jordan Accreditation System (JAS). During the summers of 2002-2012, he was invited by the Institute of Fluid Mechanics, Friedrich Alexander Universiti Erlangen-Nurnberg, Germany, the Institute of Fluid Mechanics, Technische Universiti Hamburg-Harburg, Germany, Institute for Micro technology, Technical University of Braunschweig, Germany, Institute for Aerodynamic und Gas dynamic, University of Stuttgart, Hochschule Ostwestfalen-Lippe / Standort Hoxter, where scientific research in fluid mechanics, instrumentation and renewable energy was conducted.

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