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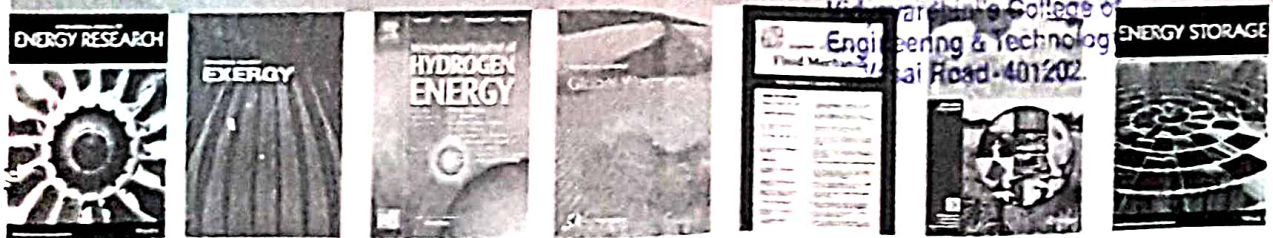
Exergy, Energy and Environment Symposium

11th International Exergy Energy & Environment Symposium

July 14 -18, 2019

Chennai, INDIA

Scientific Program



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SESSION D5: ENERGY STUDIES, TIME: 09:00-11:45 CHAIR : Prof. FETHI ALOUI CO CHAIR : Prof. KANNAN			
Paper No.	**VENUE: Prof. PETER DRUCKER HALL (MBA BLOCK)**	**Paper No.**	**VENUE: Prof. PETER DRUCKER HALL (MBA BLOCK)**
345	THERMODYNAMIC ANALYSIS OF A COMBINED VAPOUR COMPRESSION REFRIGERATION CYCLE AND ORGANIC RANKINE CYCLE CONNECTED VIA A SHARING HEAT EXCHANGER	274	MODELLING CONJUGATE HEAT TRANSFER IN CONJUNCTION WITH HIGHLY CONDUCTIVE METAL FOAM IN A VERTICAL CHANNEL
300	SULFONATED GO IN SULFONATED PEEK NANOCOMPOSITE PROTON EXCHANGE MEMBRANE FOR OF MICROBIAL FUEL CELL APPLICATION	432	THERMAL INTEGRATION OF PROTON EXCHANGE MEMBRANE FUEL CELL WITH RECUPERATIVE ORGANIC RANKINE CYCLE
318	PERFORMANCE ENHANCEMENT STUDIES USING NACA AIRFOILS FOR MICRO WIND TURBINE APPLICATIONS	276	THERMAL PERFORMANCE ANALYSIS OF SHELL AND TUBE HEAT EXCHANGER BASED ON SOLAR EVACUATED TUBES
381	EXPERIMENTAL AND CFD STUDIES ON ENERGY AND EXERGY EFFICIENCIES OF SOLAR DISH CAVITY RECEIVERS WITH DIFFERENT COIL CONFIGURATIONS	264	HYDRO TO HYDROGEN: MODELLING AN INTEGRATED HYDRO POWER DRIVEN MICROBIAL ELECTROLYSIS CELL FOR BIOH2 PRODUCTION FROM WASTEWATER

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276: Thermal Performance Analysis of Shell and Tube Thermal Energy Storage UnitUsing Evacuated Tubes Solar Collector

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Abstract:

The paper discussed an experimental work aiming to understand the role of phase change material (PCM) in a thermal insulated shell and tube thermal energy storage unit. The evacuated tubes solar collector (ETSC) used for the experimental setup. The shell and tube thermal energy storage unit consists of a single copper tube with longitudinal rectangular fins and is filled with phase change material. The ETSC has a copper heat pipe, sealed and contain a small amount of working fluid. The heat pipe of ETSC was inserted longitudinally above the single copper tube in shell and tube thermal energy storage unit. During a day period, the intensity of solar radiation falls on evacuated tubes and temperature of heat pipe increases and the PCM near the heat pipe heated first through conduction. As time increases, the PCM starts melting as the heat pipe temperature increases continuously. At the same time, the cold water enters at the inlet of a single copper tube and leaves at the other end. During this period, the heat exchange between cold water and PCM observed and an outlet of a single copper tube the temperature of water increases. The experimental readings are carried out in a day period during availability of solar radiation at a different mass flow rate of cold water at the inlet. The more amount of heat stored in a day period is obtained in the storage unit which improves the performance thermal energy storage unit. Finally, collector efficiency and system efficiency obtained in efficiency Vs time plot.

Keywords: Solar Evacuated Tube Collector, Melting, PCM, Shell and Tube Thermal Energy Storage Unit.

277: COMPUTATIONAL STUDY OF SAFE SEPARATION OF SABOT FROM PENETRATOR IN APFSDS

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Abstract:

The paper addresses the computational fluid dynamics solution for safe separation of sabot from the penetrator in armour piercing fin stabilised discarding sabot. The design and functional characteristics of sabot are modeled to achieve a safe trajectory. Driving bands are important components of APFSDS which adds the sabot together to efficiently transfer the gas forces on penetrator. Sabot, penetrator, fins and driving bands are modelled separately which further assembled together using solid works CAD software. All tri element is used to generate the un-structured surface mesh of the model using ICEM software. The aerodynamic coefficients of lift, drag and moment acting on the penetrator and sabot discard process are evaluated by using in house developed finite volume based implicit solver. The discarding process of sabot generates shocks at supersonic speed which can affect the trajectory of the penetrator during flight. The timely breaking of bands, after muzzle exit, the APFSDS is an important phenomenon to simulate and govern safe separation of sabots. Based on finite element method software, the breaking of bands was simulated to find the stress and deformation under pressure force exerted on sabot cups. The pressure exerted on sabot cups and separation of sabot due to aerodynamic forces were simulated using in house developed finite volume based implicit CFD solver. The Cl, Cd and pitch moment are plotted against the angle of sabot with penetrator which clearly indicates the uniform separation of the sabot.

Keywords: CAD, APFSDS, Cl, Cd, CFD, Lift, Drag, Moment, Muzzle, Sabot, Penetrator

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