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ENERGY AND EXERGY ANALYSES OF A LiBr-H₂O SOLAR ABSORPTION COOLING SYSTEM: A CASE STUDY FOR BRAZILIAN PUBLIC BUILDINGS

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Abstract

With the increasing number of air conditioning units, an increase in electricity consumption in tropical regions has been noticed, inducing peak loads that can damage the energy supply system. This research aims to verify the technical viability of a solar absorption cooling system to promote thermal comfort in a building located in a Brazilian public university. Therefore, this study aims to evaluate the system's performance in a practical real case application, while also evaluating its irreversibilities and pointing out which equipment parts should be optimized for a more efficient operation. For this, a theoretical analysis of a parabolic trough collector with Therminol VP1 as heat exchanger fluid was carried out. Energy and exergy analyses of the cooling system were carried out, allowing the evaluation of its performance. It was verified that the planned absorption system can supply 49 % of the building's cooling demand, with a coefficient of performance (COP) of 0.70. The exergy analysis has shown that the main losses occur in the absorber (42.07 %), throttle valve (27.37 %) and condenser (17.85 %).

Keywords: absorption cooling, energy analysis, exergy analysis, solar thermal energy, sustainability

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