**Design, Development and Performance analysis of Solar Air Heater for Drying of Agricultural products**

1. Monikesh Kakoty1 , B. Pankaj Kalita1(\*)

1School of Energy Science and Engineering, IIT Guwahati, India

E-mail: *monikesh\_kakoty@iitg.ac.in*

Solar air heating is the process of harnessing solar energy from the sun through an absorbing medium to warm the air passing through a heater. One limitation of solar air heaters is their low thermal efficiency due to low heat transfer coefficient between absorber plate and fluid. However, by implementing a double pass design, the convective heat transfer coefficient of the heat absorbing surfaces and fluid presence can be increased, resulting in significant improvements in traditional solar air heater (SAH) performance. A double-pass solar collector that utilizes porous media in the lower channel has been shown to produce a higher outlet temperature compared to a single-pass collector. This study aimed to assess the thermal efficiency of a double pass solar air heater under various experimental conditions, including collector inclinations, different mass flow rates, and wire mesh usage in the transverse direction at the second pass. The average outlet air temperature varied between 50°C to 63°C in a day, and the average temperature difference between inlet and outlet air temperature in the solar air heater was between 20°C to 31°C. The maximum thermal efficiency (48%) was achieved at a mass flow rate of 0.0216 kg s-1 and an inclination angle of 27o. The absorber plate attained a maximum temperature of 97°C.

Furthermore, the solar collector's hot air outlet provides a suitable temperature for use in a drying chamber for drying the agricultural products.

**Student Academic Board (SAB), Indian Institute of Technology Guwahati, Guwahati, Assam, India**

**Keywords:** Solar Air Heater, Wire Mesh, Porous Media