In this study, the thermal performance of a single pass solar air heater collector SP-SAH) equipped with array of rib turbulators has been experimentally) investigated. The irradiation for Nassiriya climate was simulated using six halogen lamps of 500 watts was controlled to suit the climate conditions of Nasiriya Latitude of Nasiriya (31.058°). The solar irradiance was adopted for the months) of December 2020, January, and February 2021 during the time from (8:00 to .(in as an average value between (500 W/m2 to 910 W/m2 (16:00

The considered experimental rig was a solar air heater collector; it is designed and tested indoors. The simulation process was carried out inside a room to get rid of the changing climatic conditions, and this is the main purpose of the halogen simulation process. The solar collector system consists of two parts; the lower part is, the glass cover, stagnant air space and the channel absorber plate while the upper part is a halogen lamp panel. The upper part of the rig was composed of a panel on which the lamps are installed. Six halogen lamps of (500 watts) were tested. The .(distance between the lamps and the channel was taken as (15 cm

The channel in the lower part was a rectangular cross-section with dimensions mm x 360mm x 50mm) (L x H x W). The bottom surface of the channel1250) represents an absorber plate painted with black while the top surface consists of a glass cover with a thickness of (3 cm). The absorber plate was fitted with ribs turbulators of different sizes. The back bottom of the absorber plate beside the sides of the channel was insulated with glass wool to prevent heat dissipation into the .surrounding

Four cases of absorber plate are included. The first case is a smooth absorber channel plate, the second case is absorber plate with rectangular ribs (ARC), the third case absorber plate with wavy ribs (AWV) and the fourth case is absorber plate with hybrid wavy-rectangular ribs (AHWV). The Conditions that were taken into account during the test were indoor and outdoor air temperature, solar

.(irradiance from halogen lamps, ribs arrangement, ribs geometries (length, height

Different lengths of ribs as 150mm, 10mm respectively were used, the pitch ratios

.of ribs was constant (p/e) 10. The aspect ratio (e/H) were 0.2, 0.4, 0.6 respectively

Experiments conduct within a turbulent flow for Reynolds numbers values varied

.from 5,000 to 13,000

The results showed that the solar air heater collector with hybrid wavyrectangular

AHWV) provided the higher heat transfer enhancement, thermal)

efficiency and outlet temperature as compared with the other arrangements. The efficiency of this case reaches 87% for Re= 13,000 for December at maximum solar irradiance at (1:00 pm). At the same time, it provides the highest drop in absorber plate temperature and higher values of Nusselt number as compared with the other cases. The aspect ratio (e/H) equal to 0.6 indicated the highest thermal efficiency reaches 78%, outlet temperature reaches 61◦C and highest Nusselt number reaches 12% compared to other cases values for considered Reynolds

.number values as compared with the other ratios

Finally, this system has been tested for the drying process of apple slice as a te