

**AN INVESTIGATION OF HEAT TRANSFER ENHANCEMENT AND FRICTION
CHARACTERISTICS IN SOLAR AIR HEATER DUCT WITH CUBE SHAPED UNIFORM
ROUGHNESS ON THE ABSORBER PLATE**

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ABSTRACT

An experimental investigation of heat transfer enhancement and friction characteristics of fully developed turbulent flow in a rectangular duct of solar air heater with absorber plate having cube shaped uniform artificial roughness on its underside is carried out. The investigation covers wide range of different geometrical parameters of cube shaped uniform roughness. The relative roughness pitch (p/e) used is 10 and 20, relative roughness height (e/D_h) is 0.04, relative roughness gap (w/e) used is 4 and 8 and angle of attack of flow (α) is 90° . Duct aspect ratio (W/B) is kept 5 and Reynolds number (Re) is varied from 3,000 to 8,000. The heat transfer and friction factor values obtained are compared with those of smooth duct under similar flow conditions. Investigation shows 1.82 and 2.87 times enhancement in Nusselt number and friction factor respectively.

KEYWORDS: Friction Factor, Nusselt Number, Thermo-Hydraulic Performance