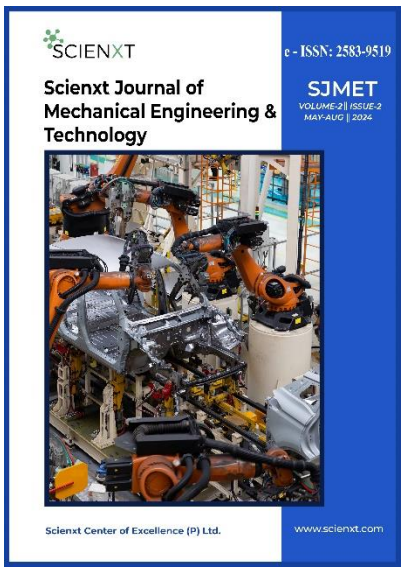

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Reviewing the comparative thermal performance of solar air heaters with artificially roughened absorber plates

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Abstract:

Artificial roughness is often employed to augment heat transfer rates in solar air heaters. Extensive literature exists detailing diverse configurations and geometries of roughness elements, each yielding varying degrees of heat transfer effectiveness in terms of quality and quantity. This paper conducts a comprehensive review, examining both quantitative and qualitative aspects of heat transfer rates in artificially roughened solar air heaters across a spectrum of configurations. Analytical and experimental findings, alongside derived values utilizing equations or correlations established by researchers, are synthesized to evaluate heat transfer performance concerning roughness and flow parameters (p/e, e/D, and Re). Result indicate that multi V-roughness exhibits the highest average Nusselt number in experimental data, while end-of-side roughened solar air heaters yield maximum analytical Nusselt number values.

Keywords:

Relative roughness pitch (P/E), Relative roughness height (e/D), Flow Reynolds number (Re) and Average Nusselt number (Nu_r).