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The stability of the radiative regime does influence the daily performance of solar air heaters

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16
17 **Abstract**

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19 The dependence of the daily photothermal conversion performance on the stability of the radiative regime
20 has been rarely treated in literature and only for systems based on water collectors. The objective here is to
21 estimate whether the daily performance of solar air collectors is dependent on the radiative regime
22 characteristics other than the level of daily solar irradiation. Results are obtained by comparing the
23 performance of two solar air collectors whose design is almost similar but one has a porous absorber and
24 the other has a U-corrugated absorber. First, the daily performance of the collectors are analyzed
25 experimentally during clear sky days in Bucharest (Romania, South Eastern Europe). The instantaneous
26 performance of the collector based on porous absorber is generally higher than that of the collector based
27 on U-corrugated absorber. Second, dynamic models are developed and validated against measurements
28 obtained in Bucharest. Two new performance indicators specific to time dependent operation are defined. It
29 is shown that these indicators equal each other at steady state but in transitory operation they have different
30 values. Simulations are performed for collectors operation under the climate of Timisoara (Romania). Eight
31 days, covering all four seasons and belonging to different relative sunshine classes and different radiative
32 regime stability levels are selected. At daily level, the collector based on porous absorber is more effective
33 than the collector based on U-corrugated absorber. When the instantaneous performance is considered, the

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