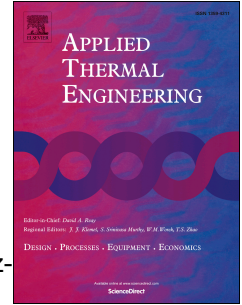


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## NEW METHODOLOGY FOR THE CHARACTERISATION OF THERMAL PERFORMANCE IN A HOT WATER STORAGE TANK DURING CHARGING

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### ABSTRACT

In solar water heating systems, the application of certain stratification indices requires the characterisation of the water temperature distribution profile inside the tank and its evolution. In order to avoid the limitations and drawbacks related to the discrete measures provided by experimental trials, this paper presents a newly developed method, called Virtual TC, which allows the water temperature to be estimated at any depth and at any time in a storage tank during the charge process. The proposed methodology can be very useful for estimating the numerous temperature-dependent indices employed for the characterisation and evaluation of thermal stratification in water storage tanks. As a practical example, it was successfully applied to determine the instantaneous temperature profile and thermocline thickness and its evolution throughout charging.

It is concluded that the Virtual TC method gives highly satisfactory results under normal operational conditions for a hot water storage tank during the charge cycle.

**Keywords:** thermal energy storage, curve fitting, five-parameter logistic function, stratification indices, temperature profile, thermocline thickness evolution.

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