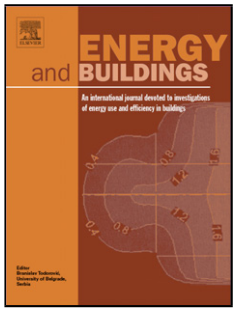

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PII: S0378-7788(16)31312-3
DOI: http://dx.doi.org/doi:10.1016/j.enbuild.2017.05.023
Reference: ENB 7604

To appear in: *ENB*

Received date: 26-10-2016
Revised date: 12-4-2017
Accepted date: 11-5-2017

Please cite this article as: Juan Luis Foncubierta Blázquez, Ismael R.Maestre, Francisco Javier González Gallero, Pascual Álvarez Gómez, A new practical CFD-based methodology to calculate the evaporation rate in indoor swimming pools, Energy and Buildingshttp://dx.doi.org/10.1016/j.enbuild.2017.05.023

A new practical CFD-based methodology to calculate the evaporation rate in indoor swimming pools

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Highlights

1.- A new CFD-based method to calculate evaporation rate.

2.- Main hypotheses set no shear stress at the air-water interface.

3.- The model was experimentally validated with data from test chambers and a real swimminng-pool.

4.- Results were quite satisfactory with low relative errors.

Abstract

This paper presents a new methodology in which a computational fluid dynamics model is applied to estimate water evaporation rate in indoor swimming pools. This rate is needed to achieve a suitable energy performance of ventilation and dehumidification systems. The main hypotheses of the model set the following boundary conditions at the air-water interface: air temperature equal to water temperature, water vapour concentration equal to saturation humidity of air at water temperature and free slip wall condition (no shear stress). This last condition can be justified by the fact that Prandtl and Schmidt turbulent numbers are usually less than one in this kind of flows. Consequently, the dynamic boundary layer depth will be