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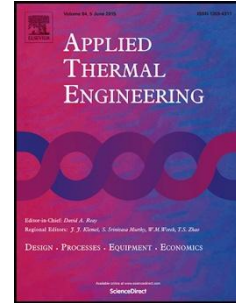
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# 1 Study of a fogging system using a computational fluid dynamics 2 simulation

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11 Keywords: Evaporative cooling, fogging system, relative humidity, CFD

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13 Highlights

- 14 • Fogging is the most effective methods for lowering air temperature in gas turbines.
- 15 • A CFD study was performed to investigate mist dynamics at a turbine's inlet duct.
- 16 • Residence time, mass transfer and coalescence of water droplets was studied.
- 17 • CFD results compared against experimental data with differences from 3 to 6%.
- 18 • Larger mass transfer occurs with droplets of 20µm and lowest relative humidity.

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20 Abstract:

21 *Fogging is one of the most effective methods for lowering the air temperature in rooms and*  
22 *greenhouses. It also has many industrial applications, especially in gas turbines where this*  
23 *method presents great advantages over others in terms of achieving better turbine*  
24 *performance in hot weather conditions.*

25 *With this in mind, a numerical study was performed in STAR-CCM+ to investigate mist*  
26 *dynamics at a turbine's inlet duct, specifically measuring: (i) residence time of water droplets;*  
27 *(ii) mass transfer between water and air; (iii) coalescence and agglomeration of the water*  
28 *droplets; and, (iv) changes in air density and temperature inside the duct. The results were*  
29 *compared against the same variables taken from experimental wind tunnel data, and found to*  
30 *be similar with respect to the behavior of temperature and relative humidity.*

31 *Therefore, it was possible to conclude that the results obtained in the simulation were close to*  
32 *those reported experimentally with differences from 3 to 6%. Based on the profiles and contour*

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