

Abstract Submitted
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Effect of single silica gel particle adsorption on the transport processes in a humid air stream APRATIM SANYAL, SAPTARSHI BASU, PRAMOD KUMAR, Indian Institute of Science, Bangalore — The effect of adsorption due to a single silica gel particle on a convective field consisting of humid air has been investigated numerically. The adsorption is incorporated as a sink term in the transport equation for species (water vapor) and has been modeled using Linear Driving Force model, while the heat released due to adsorption is taken as source term in the energy equation and proportional to the amount of water vapor adsorbed. The heat released creates a coupling between the species and the temperature field as the adsorption characteristics are directly influenced by particle temperature. The extent of species and temperature boundary layer show the diffusion of the adsorption effects into the free stream. Surface adsorption is found to decrease with Reynolds no. The particle surface temperature increases from forward stagnation point till downstream. This work provides a model for understanding the adsorption kinetics in convective stream for other adsorbate-adsorbent pair. Further more complex scenarios can be modeled such as presence of multiple adsorbent particles, the interaction of species and temperature boundary layers setup due to individual particles and their influence on the overall adsorption characteristics.

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