

Abstract Submitted
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Modeling thermophoretic deposition of particles from a hot fluid stream ZACHARY MILLS, WENBIN MAO, Georgia Tech, ALOK WAREY, ANIL SINGH BIKA¹, VENKATESH GOPALAKRISHNAN, General Motors Research and Development Center, ALEXANDER ALEXEEV, Georgia Tech — We developed a three dimensional computational model to examine the deposition of aerosol particles in heat exchangers. Our model combines a thermal lattice Boltzmann model for simulating the fluid flow and temperature distribution in the heat exchanger and a Brownian dynamics model that is used to model the transport and deposition of aerosol particles. In our simulations, we investigated particle deposition resulting from convection, thermophoresis, and diffusion. To validate our model we directly compare the simulation results with experimental data for the deposition of particles in a model heat exchanger. We augment our model with a model that describes particle adhesion to the heat exchanger walls. It allows us to examine the formation and buildup of the deposit layer for different flow conditions and particle distributions. Thus, our results provide useful insights into the deposit formation process that are needed for designing heat exchangers that are less prone to fouling.

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