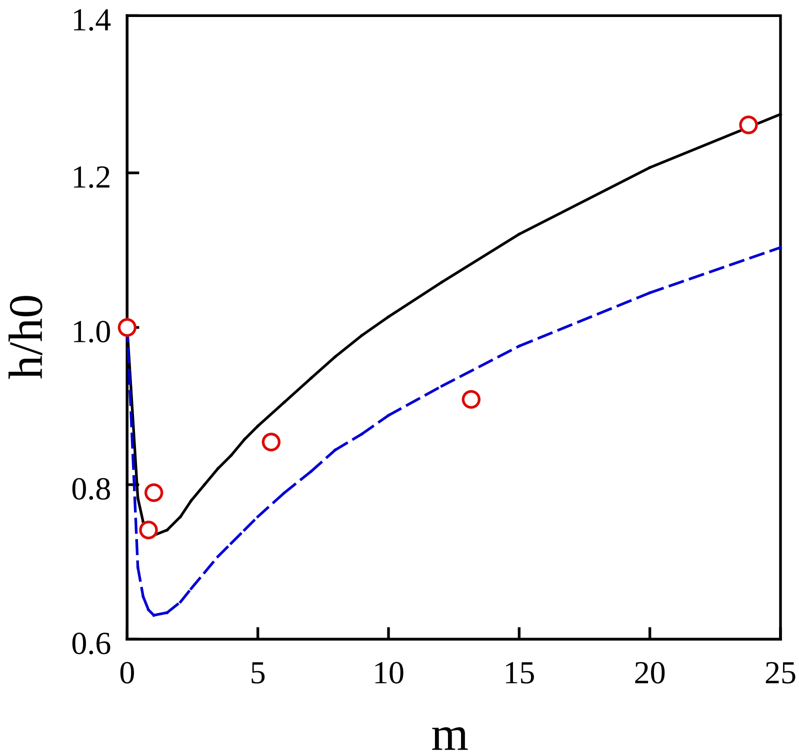
Louge, M., Mohd. Yusof J. and Jenkins J.T.: “Heat Transfer in the Pneumatic Transport of Massive Particles,” *Int. J. Heat & Mass Trans.* **36** (2), 265-275 (1993).

We analyze the steady, fully-developed heat transfer to the walls of a vertical pipe from a dilute suspension of relatively massive particles of low Biot number in a turbulent gas. In this flow, particle collisions play a significant role. The thermal energies of the particle and gas phases are balanced using two coupled equations. In the particle phase, conduction is calculated from the kinetic theory as a self-diffusive transport flux and, assuming negligible transfer of heat during collisions, homogeneous boundary conditions are prescribed for the temperature. Solutions of the balance laws highlight the mechanisms governing the heat transfer in this regime.

Figure excerpts



Predictions of the analysis compared with the data of Jepson, Poll, and Smith [1] for sand particles of 422µm ≤d≤ 599µm suspended by air in a pipe of 38mm in diameter. Here, Re_D = 45000, ρ_p/ρ = 2100, 6300≤Ar≤18000, c_p/c = 0.8 and Pr = 0.7. The solid and dashed lines are predictions for 422µm and 599µm, respectively. For these conditions, $\Theta^{1/2}$ is approximately 1% of the gas velocity at the centerline.