TRANSPORT PHENOMENA & FLUID MECHANICS

平面冲击射流场中纳米颗粒凝结和扩散的矩积分方法

于明州[1], 林建忠[1,2], 熊红兵[1]

[1] The State Key Laboratory of Fluid Power Transmission and Control, Zhejiang University, Hangzhou 310027, China

[2] China Jiliang University, Hangzhou 310018, China

摘要　A computational model combining large eddy simulation with quadrature moment method was employed to study nanoparticle evolution in a confined impinging jet. The investigated particle size is limited in the transient regime, and the particle collision kernel was obtained by using the theory of flux matching. The simulation was validated by comparing it with the experimental results. The numerical results show coherent structure acts to dominate particle number intensity, size and polydispersity distributions, and it also induce particle-laden jet to be diluted by the ambient. The evolution of particle dynamics in the impinging jet flow are strongly related to the Reynolds number and nozzle-to-plate distance, and their relationships were analyzed.

关键词　nanoparticle　coagulation　impinging jet　large eddy simulation　quadrature moment method

分类号

DOI:

Quadrature method of moments for nanoparticle coagulation and diffusion in the planar impinging jet flow

YU Mingzhou[1], LIN Jianzhong[1,2], XIONG Hongbing[1]

[1] The State Key Laboratory of Fluid Power Transmission and Control, Zhejiang University, Hangzhou 310027, China

[2] China Jiliang University, Hangzhou 310018, China

Abstract　A computational model combining large eddy simulation with quadrature moment method was employed to study nanoparticle evolution in a confined impinging jet. The investigated particle size is limited in the transient regime, and the particle collision kernel was obtained by using the theory of flux matching. The simulation was validated by comparing it with the experimental results. The numerical results show coherent structure acts to dominate particle number intensity, size and polydispersity distributions, and it also induce particle-laden jet to be diluted by the ambient. The evolution of particle dynamics in the impinging jet flow are strongly related to the Reynolds number and nozzle-to-plate distance, and their relationships were analyzed.

Key words　nanoparticle; coagulation; impinging jet; large eddy simulation; quadrature moment method

通讯作者:
于明州 mecjzlin@public.zju.edu.cn
作者个人主页: 于明州[1]; 林建忠[1;2]; 熊红兵[1]