Reynolds Number Effects on the Flow Around Square Cylinder Based on Lattice Boltzmann Method

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Abstract

The Lattice Boltzmann (LB) equation is discussed from the point of molecule kinetic theory at first. Based on the turbulence theory, eddy viscous turbulence model is incorporated into the LB equation to simulate the turbulence flow at high Reynolds number. The flows around square cylinder are simulated in the range of Reynolds number from 10 to 10^5 , and the Reynolds number effects on drag, Strouhal number and flow field are investigated in details. Figure 1 and Figure 2 show that the drag and vortexes shedding frequency of square cylinder are dependent on Reynolds numbers. The turbulence LB method is verified by the comparison of present results with those of other numerical methods and experiments.

Figure 1: Drag coefficients depending on Re Figure 2: Strouhal number depending on Re

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