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Turbulent Viscosity Coefficient in Low-Reynolds-Number Turbulence[1] HIROSHI SHIBATA, Sojo University — A new model for the Large Eddy Simulation (LES) is proposed. The LES has been accepted as the standard formalism. In the application of the LES, several models are chosen. The purpose of this paper is for us to propose one of the most physical models. The LES is usually written down as

$$\frac{\partial U_i}{\partial t} + (\vec{U} \cdot \vec{\nabla})U_i = -\frac{1}{\rho}\frac{\partial P}{\partial x_i} + \nu_0 \Delta U_i - \frac{\partial Q_{ij}}{\partial x_j}. \quad (1)$$

The above equation is rewritten as

$$\frac{\partial U_i}{\partial t} + (\vec{U} \cdot \vec{\nabla})U_i = -\frac{1}{\rho}\frac{\partial P}{\partial x_i} + \nu \Delta U_i \quad (2)$$

and ν is referred to as turbulent viscosity coefficient. The statistical mechanical method by Helfand[1] is reformed by the replacement of the relationship between the local velocity and the kinetic viscosity coefficient by the one between the turbulent velocity and the turbulent viscosity coefficient. The major assumption here is the Gaussian statistics for the turbulent velocity. The concrete calculation using the lattice Boltzmann method is shown for the low-Reynolds-number turbulence. [1] E. Helfand, Phys. Rev. 119,1(1960).

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