SIMULATION OF BOTTOM STRATIFIED CURRENTS BY VERTICAL TWO-DIMENSIONAL MODELING

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According to conservation law of mass and momentum in stratified flow field, a vertical two-dimensional model was constructed by the finite-difference method with MAC staggered-grid system. Large eddy Simulation method (LES) is used to calculate the eddy viscosity. Concept of Schmidt number about the ratio of momentum and mass transportation is used to calculate the eddy diffusion. The concentration profiles of the stratified current and the flushing-out condition from a slot connected to a rectangular flume of dimension with 180cm long and 40cm in height was simulated (Fig. 1 and 2). Saline-water instead of slurry is used to form a bottom stratified current and red color is applied for dyeing (Fig.3). According to experimental results, we verified the usefulness of using LES method and concept of Schmidt number to simulate the concentration distribution of the stratified current and the flushing-out condition from a slot. The applicable range of the Schmidt number of the saline-water is suggested.

Key word: bottom stratified currents, LES, Schmidt number

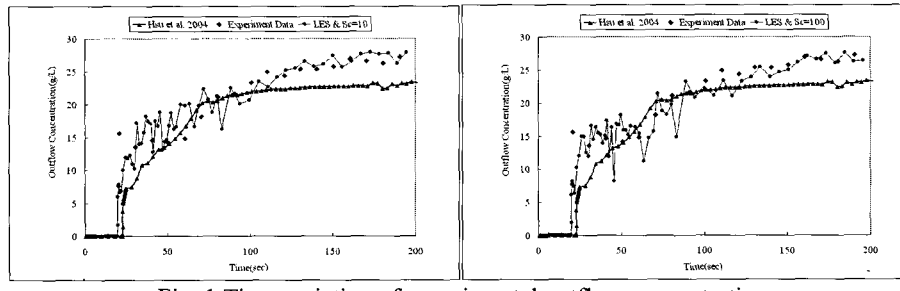

Fig. 1 Time variation of experimental outflow concentration
(a) Sc=10 (c) Sc=100(Z_0/H= 0.2)

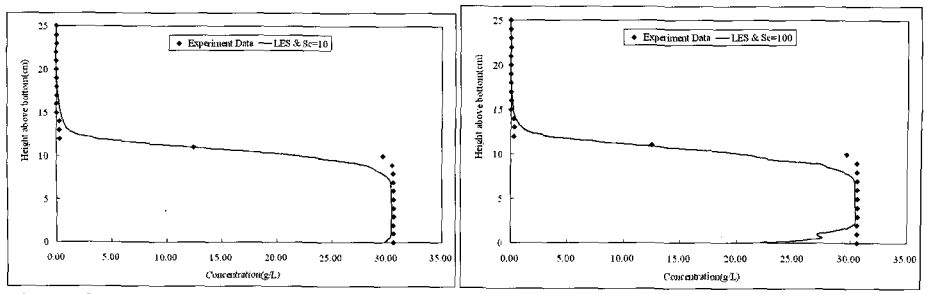

Fig. 2 Comparison of numerical simulation and experimental data at the representative section (85 cm upstream of the slot) of the flume(C = 30.6g/L) (a) Sc=10(c) Sc=100 (Z_0/H= 0.2)

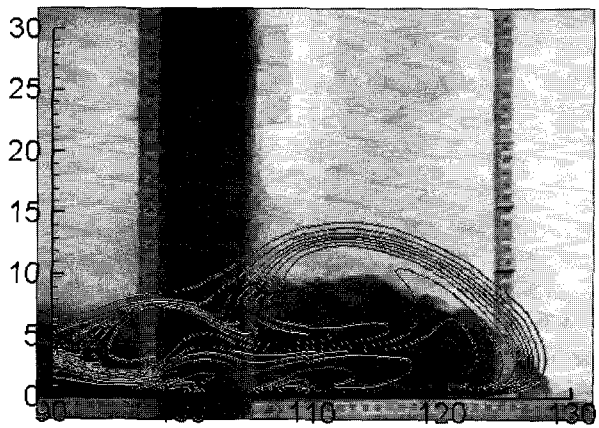

Fig. 3 The head shape of bottom stratified current of numerical simulation and experiment

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