Poster 2 Neuvazhayev

The analysis of experiments and calculations for determination of intensity of turbulent mixing on the basis of turbulent mixing model of diffusion type

V.E. Neuvazhayev

Russian Federal Nuclear Center – VNIITF,
Snezhinsk, Chelyabinsk region, Russia
v.e.neuvazhayev@vniitf.ru

The analysis and comparison of known experimental and calculated (direct numerical simulation) results of research of gravitational turbulent mixing is carried out from uniform positions on the basis of semi-empirical model of turbulent mixing of diffusion type. The value of a basic constant of mixing α_1 was determined which described the intensity of penetration of easy substance into heavy.

In presented paper together with simple test problems the experiments are attracted, where complex non self-similar modes were performed. Due to presence of an exact solution these complex flows can be handled and the constant α_1 can be determined from them.

At first experimental results for incompressible liquids are analyzed. Three cases are considered: 1) a self-similar problem about mixing of two adjoining liquids with densities ρ_1 and ρ_2, that are in gravitational field g, 2) the same problem, but liquids are inter-soluble, therefore at the initial moment the interface is diffusion, that introduces the specificity in the problem, 3) mixing of a finite layer that is located in an infinite medium of other density. For these three problems there are experimental results, and also exact analytical solutions are constructed within the framework of *lv*-model, that allows determining the value of constant α_1.

Also the handling and analysis of experiences with compressible gases are carried out.

The results of three-dimensional numerical simulation of gravitational turbulent mixing are analyzed.

Unfortunately, a scatter in definition of turbulent mixing intensity α_1 remains significant. Most probably, a reason of it is the slow outcome on a developed self-similar turbulence and thus the initial data are remembered rather long.

For now, probably, it is necessary to count, that the constant of mixing has the following indeterminacy $\alpha_1 = 0.02 \sim 0.08$.