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Direct numerical simulation of shear-gravitational turbulent mixing

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The paper addresses the problem of turbulent mixing at a plane interface of two different-density incompressible fluids in gravitational field with a velocity shear at the interface. This flow type occurs, for example, in the upper or lower part on the initial area of plane or circular jets, whose density is other than that of the surrounding jet.

The paper studies the problem with a stable gravitational acceleration direction using direct numerical simulation with 3D gas-dynamic code TREK [1]. The computations were conducted on a fine computational grid with parallelization to several tens of processors.

Moments of the quantities are found using numerical arrays of hydrodynamic quantities from 3D computations. The spectral analysis of the velocity fluctuation in TMZ has been performed: its approximation to Kholmogorov spectrum has been studied.

Some results of the 3D computations are compared to those of measurements [2-4] as well as to the data of semi-empirical theory of turbulence [5] that regards for Reynolds tensor anisotropy.

References

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