

Investigation of interaction of the vortex structures by virtue of modified contour dynamic method and formation of the fractal vortices

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One of the most effective methods of modeling of the vortical structures described by the 2-dimensional equation of the vortex transfer and the Poisson equation for a flow function, namely, the contour dynamics (CD) method which is based on representation of a vortical stream by the finite area vortical regions (FAVR) is considered. The modification of the CD method minimizing the errors arising at its direct application to the description of vortical structures is offered. The examples of the results of numerical experiments on study of the dynamics of interaction of vortical structures for various configurations of their relative positioning, signs of vorticity and distances between borders of the FAVRs are presented.

Evolution of the vortex structures in non-stationary media can represent the turbulent state in flows. The possibility of Lagrange chaos (chaotic advection) in two dimensional vortex structures is studied for investigation of this problem. Numerical analysis of interaction of different type vortex structures with flows reveals that formation of the fractal structures can appear in the medium. The fractal nature of the vortices should be taken into account at investigation of the heat, particle, field and electromagnetic waves' transfer processes in the medium.

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Reference

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