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The boundary-constraint method for constructing vortex-surface fields[1] SHIYING XIONG, YUE YANG, Peking Univ — We develop a boundary-constraint method for constructing the vortex-surface field (VSF) in a three-dimensional fluid velocity field. The isosurface of VSF is a vortex surface consisting of vortex lines, which can be used to identify and track the evolution of vortical structures in a Lagrangian sense. The evolution equation with pseudo-time is solved under the boundary constraint of VSF to obtain an approximate solution of VSF. Using the boundary-constraint method, we construct the VSFs in Taylor-Green flow and transitional channel flow. The uniqueness of VSF are demonstrated with different initial conditions, and the consistency of this boundary-constraint method and the previous two-time approach for constructing VSF is discussed. In addition, the convergence error in the calculation of VSF is analyzed.

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