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**Dipole method for incompressible flows and its test calculation of time evolution of a dipolar vortex** YUKO MATSUMOTO, KAZUYUKI UENO, Tohoku University — A new numerical method to calculate an incompressible flow, a dipole method, is proposed. In the dipole method, a flow field is represented by superposition of many dipolar vortices, and these dipolar vortices are replaced "dipole elements." The dipole elements move in fluid. Each dipole element is characterized by two variables, dipole moment and core radius. The dipole moment is a vector quantity whose direction is the same as the axis of the dipolar vortex. The core radius is an effective radius of rotational flow region of the dipolar vortex. These variables, changed with time, are determined by the momentum conservation law where the flow around the dipolar vortex is assumed to be irrotational. This dipole element has a self-induced velocity. Time evolutions of a dipolar vortex in two cases of background flows are simulated, the first case is a strain flow, and the second one is a rotational flow of the Rankin's vortex. The results of the dipole method are compared to numerical simulations using the vortex method with the same initial condition.

Yuko Matsumoto
Tohoku University

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