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Compressible point vortices TIANYI CHU, STEFAN LLEWELLYN SMITH, ZINAN HU, University of California, San Diego — The effect of weak compressibility on unsteady point vortices is studied for two-dimesional adiabatic flow. The appropriately non-dimensionalized Blokhintsev equation governs the motion, and is solved asymptotically in the region between vortices. This approximation fails near the vortex cores and in the far field. An appropriate asymptotic matching with the core region is carried out, coupled with the momentum balance over the cores, to obtain governing equations. The flow is expressed using a Rayleigh-Jansen expansion in M^2. To carry out the matching, it is necessary to consider the locations of vortices to vary over slow time scales of $O(M^2)$ and $O(M^2 \log M)$. Higher-order single-valued complex potentials are obtained locally, and appropriate terms are added to remove unacceptable singularities. The equations of motion at different orders are calculated by implementing conservation of momentum. Matching with the far field is also considered to examine waves generated by the motion of the vortices. Results are presented for a co-traveling and a co-rotating dipole, and are compared to known steady solutions.

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