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Buoyant Norbury's vortex rings MARK BLYTH, Univ. of East Anglia, JAVIER RODRIGUEZ-RODRIGUEZ, Carlos III Univ. Madrid (UC3M), HAYDER SALMAN, Univ. of East Anglia — Norbury's vortices are a one-parameter family of axisymmetric vortex rings that are exact solutions to the Euler equations. Due to their relative simplicity, they are extensively used to model the behavior of real vortex rings found in experiments and in Nature. In this work, we extend the original formulation of the problem to include buoyancy effects for the case where the fluid that lies within the vortex has a different density to that of the ambient. In this modified formulation, buoyancy effects enter the problem through the baroclinic term of the vorticity equation. This permits an efficient numerical solution of the governing equation of motion in terms of a vortex contour method that tracks the evolution of the boundary of the vortex. Finally, we compare our numerical results with the theoretical analysis of the short-time evolution of a buoyant vortex. Funded by the Spanish Ministry of Economy and Competitiveness through grant DPI2011-28356-C03-02 and by the London Mathematical Society.

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