Yang, Jianfu

Global vortex rings and asymptotic behaviour. (English) Zbl 0845.76017

Nonlinear Anal., Theory Methods Appl. 25, No. 5, 531-546 (1995).

The existence of solution is investigated in the case of steady axisymmetric vortex rings in an ideal fluid. The dependence between stream-function and vorticity is supposed to be known. The vortex-strength parameter and the propagation velocity of the vortex ring are prescribed as well. A direct variational method is used; it is proved that the corresponding functional is differentiable, and the minimizing sequences of a constrained variational problem are precompact. The main result on the asymptotic behaviour is that the cross-section of a steady vortex ring shrinks to a point, and the vortex ring degenerates into a singular circle as the vortex-strength parameter tends to infinity.

Reviewer: A.Berezovski (Tallinn)

MSC:

76B47 Vortex flows for incompressible inviscid fluids
35Q35 PDEs in connection with fluid mechanics

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precompact minimizing sequences; existence theorem; steady axisymmetric vortex rings; vortex-strength parameter; direct variational method; constrained variational problem

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