

**Alonso-Orán, Diego; Velázquez, Juan J. L.**

**Boundary value problems for two dimensional steady incompressible fluids.** (English)

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**Summary:** In this paper we study the solvability of different boundary value problems for the two dimensional steady incompressible Euler equation and for the magneto-hydrostatic equation. Two main methods are currently available to study those problems, namely the Grad-Shafranov method and the vorticity transport method. We describe for which boundary value problems these methods can be applied. The obtained solutions have non-vanishing vorticity.

**MSC:**

35Q31 Euler equations

76W05 Magneto-hydrodynamics and electrohydrodynamics

76B03 Existence, uniqueness, and regularity theory for incompressible inviscid fluids

35M12 Boundary value problems for PDEs of mixed type

35A01 Existence problems for PDEs: global existence, local existence, non-existence

35A02 Uniqueness problems for PDEs: global uniqueness, local uniqueness, non-uniqueness

**Keywords:**

steady fluids; magneto-hydrostatic equations; boundary value problems; well-posedness

**Full Text:** [DOI](#) [arXiv](#)

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