

On free boundary problem for viscous incompressible magnetohydrodynamics (mhd)

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**Abstract**

We consider the motion of a viscous incompressible mhd in a domain bounded by a free surface. In the exterior domain we only have the electromagnetic field. The existence of solutions to a linearized problem in anisotropic  $L_p$ -Sobolev spaces is proved by the technique of regularizer. In this case by the Fourier-Laplace transform we solve explicitly local in space problems. Then by the inverse Fourier-Laplace transform and the theory of Bessel potentials we obtain necessary local estimates in anisotropic Sobolev and Sobolev-Slobodetskii spaces. Finally by an appropriate partition of unity the necessary estimate in the whole considered domain follows. The existence of the nonlinear problem is proved by the method of successive approximations. We consider a local existence only.