On free boundary problems of hydrodynamics and magnetohydrodynamics

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The talk is devoted to initial-boundary value problems for the Navier-Stokes equations where the domain occupied by the liquid is given only at the initial moment and should be found together with the unknown functions (velocity, pressure) for the positive value of time. As an example, we consider an isolated liquid mass or the motion of the liquid partially filling a container. At the free (unknown) surface of the liquid the boundary conditions usually express equilibrium of viscous stresses, capillary and external forces. In the case of motion of two immiscible liquids separated by a free interface this equilibrium is expressed by appropriate jump conditions on the interface.

In the free boundary problems of magneto-hydrodynamics one should take into account also of the forces due to the magnetic field satisfying the Maxwell equations.

Some free surface problems of this type will be discussed.