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| | **abstract** | This article is concerned with the global exact controllability for ideal incompressible magnetohydrodynamics in a rectangular domain where the controls are situated in both vertical walls. First, global exact controllability via boundary controls is established for a related Els\"asser type system by applying the return method, introduced in [Coron J.M., Math. Control Signals Systems, 5(3) (1992) 295--312]. Similar results are then inferred for the original magnetohydrodynamics system with the help of a special pressure-like corrector in the induction equation. Overall, the main difficulties stem from the nonlinear coupling between the fluid velocity and the magnetic field in combination with the aim of exactly controlling the system. In order to overcome some of the obstacles, we introduce ad-hoc constructions, such as suitable initial data extensions outside of the physical part of the domain and a certain weighted space. | **abstract** | This article is concerned with the global exact controllability for ideal incompressible magnetohydrodynamics in a rectangular domain where the controls are situated in both vertical walls. First, global exact controllability via boundary controls is established for a related Els\"asser type system by applying the return method, introduced in [Coron J.M., Math. Control Signals Systems, 5(3) (1992) 295--312]. Similar results are then inferred for the original magnetohydrodynamics system with the help of a special pressure-like corrector in the induction equation. Overall, the main difficulties stem from the nonlinear coupling between the fluid velocity and the magnetic field in combination with the aim of exactly controlling the system. In order to overcome some of the obstacles, we introduce ad-hoc constructions, such as suitable initial data extensions outside of the physical part of the domain and a certain weighted space. | | |
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