

Abstract Submitted
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Optimal linear growth in MHD duct flow¹ THOMAS BOECK, Mech. Eng., TU Ilmenau, DMITRY KRASNOV, Mech. Eng., TU Ilmenau, Germany, MAURICE ROSSI, Univ. Paris VI, France, OLEG ZIKANOV, Mech. Eng., U Michigan-Dearborn — We consider the flow of an electrically conducting fluid in a rectangular duct under a homogeneous magnetic field. The field is perpendicular to the flow direction and parallel to one set of the non-conducting walls. Our focus is on the transient growth of linear perturbations as a prerequisite for subsequent numerical studies of subcritical transition in the MHD duct flow. The perturbations with strongest transient growth are obtained by an iterative method based on linearized perturbation equations and their adjoint equations. We study the effect of the magnetic induction and of the aspect ratio of the duct on the maximum energy amplification and on the corresponding spatial structure of the linear perturbations. For wide ducts with magnetic field perpendicular to the long walls we find considerable differences to the periodic channel with wall-normal magnetic field. For narrow ducts the agreement with the periodic channel with spanwise magnetic field is considerably better.

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