EFFECT OF THE ORIENTATION OF THE APPLIED MAGNETIC FIELD ON THE IMBALANCE OF MHD FLOWS IN A MANIFOLD SYSTEM

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Abstract - In this study, numerically analyzed is the characteristics of three-dimensional liquid metal (LM) magneto-hydrodynamic (MHD) flows in a manifold system which consist of three parallel sub-channels by using commercial code CFX. . In the manifold, flows are driven by the constant pressure gradients in three sub-channels, so that mass flow imbalance may be observed under various conditions. Particularly examined are the effects of the variation of the orientation of applied magnetic field as well as the distribution of the electric conductivity of the duct walls on the mass flow imbalance among the sub-channels in the manifold system. Here, the mechanism causing the imbalance in mass flow rate with respect to the orientation of magnetic field is discussed in detail. In addition, the interdependency of the current, electric potential, velocity, pressure gradient and temperature of LM MHD flows in the manifold is described.

Index Terms - LM MHD, CFX,Manifold, Electric conductivity, Flow imbalance