

One Dimensional Analysis of the End Effect of an EM Pump

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Abstract

Longitudinal end effect due to finite length of the pump are analyzed one dimensionally on an annular linear induction electromagnetic (EM) pump for the transportation of the electrically conducting liquid metal. The mathematical regions of the modeled pump is divided into three of the inlet, outlet and developing zone in large parts. Solving governing equations with the applied boundary condition, the distributions of magnetic field and developing force are investigated according to the coordinate of axial direction and compared with those of the pump with infinite length. At both ends of the pump, it is shown that the radial magnetic field is distorted and even the opposite force, which may cause local separation of the flow as the velocity of the pumping fluid is increased, is generated at the inlet region. In the present study, frequency control is suggested as one of the methods for the reduction of the end effect of the pump.