

Transient Magnetohydrodynamic Flow in an Annular Channel

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1. Introduction. In a previous paper [1], we have investigated a pulsating flow in an annular channel with a radial transverse magnetic field. The problem of unsteady magnetohydrodynamic flow in a rectangular duct has been solved by Lundgren, Atabek and Chang [2]. These authors have obtained an exact solution for a duct with rectangular geometry. But no work has so far been done for a similar unsteady flow problem when the rectangular duct is replaced by a duct with circular geometry. The purpose of the present investigation is to obtain a transient solution for the problem of unsteady flow in an annular channel with an impressed radial transverse magnetic field.

We consider an unsteady parallel flow of a viscous incompressible electrically conducting fluid in the annulus between two infinitely long coaxial perfectly conducting cylinders. The geometry considered is shown in the following diagram, the inner and outer radii of the annulus being a and b respectively.

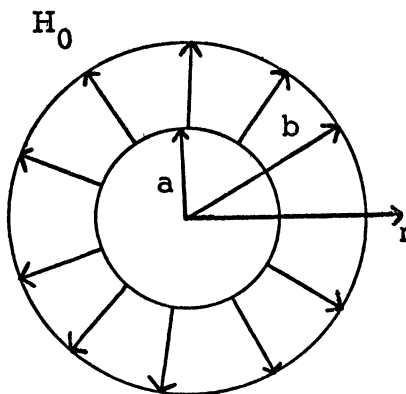


FIGURE 1. Annular channel with impressed radial field.

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