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**Theoretical Prediction of MHD Pressure Drop of Sodium Flow
under Transverse Magnetic Field**

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Abstract

Magnetic Field has much effects on hydraulic pressure drop of fluid with the high electrical conductivity. In the present study, solution on MHD pressure drop is sought theoretically for the uniform current density model with simplified physical geometry. Using the MHD equation in the rectangular duct of the sodium liquid flow under transverse magnetic field, electrical potential is sought in terms of the duct geometry and the electrical parameters of liquid metal and duct material. By the product of induced current inside liquid metal and transverse magnetic field, the pressure gradient is found as a function of the duct size and the electrical conductivity of liquid metal. As a result, pressure drop is theoretically predicted according to flow velocity and magnetic flux density. A experiment is prepared for the examination of the theory.