INVESTIGATIONS ON THE PRESSURE DISTRIBUTION INSIDE THE "EIERUHR" BY MEANS OF DIAMAGNETIC SIGNALS

by

O. Klüber

Institut für Plasmaphysik, Garching b. München, Germany

Abstract

"Eieruhr" is a linear, stationary discharge in the field of a cylindrical coil. The difference of the pressures at the axis of the plasma column and in the surrounding neutral gas is about one atmosphere. There are two contributions to this compression: the pinch effect (force between the discharge current and its own magnetic field) and the force between ring currents in the plasma and the meridional field induced by the coil currents and the plasma ring currents. The discharge is surrounded by pickup coils to measure the magnetic flux of the meridional field. Using a difference method the contributions ϕ_c and ϕ_p of the coil and the plasma currents are measured separately. ($\phi_p \approx 10^{-3} \phi_c$). By a quantitative relation between ϕ_p and the plasma ring currents the contribution of these currents to the pressure rise is determined. This contribution is found to exceed the pinch effect for the part of the plasma inside the coil. It is shown that in this region the plasma ring currents are caused primarily by two effects: the amibipolar diffusion and a thermomagnetic effect, the so-called Nernst effect.