CORRELATION OF ELECTRON DENSITY DISTRIBUTIONS AND NEUTRON EMISSION DURING CHARACTERISTIC PHASES OF PLASMA COLUMN EVOLUTION IN PF-1000 DEVICE


P. Kubes, K. Rezac, D. Klir
Czech Technical University, 167 27 Prague, Czech Republic

Plasma Focus device are simple and effective sources of neutrons produced in deuterium-deuterium reactions. The PF-1000 device, placed at IPPLM in Warsaw, is a facility used to study of mechanisms of D(d,n)3He reactions due to relatively high neutron yields and the convenient horizontal position of the device axis.

The work contains results of complex research using the interferometric system (allowing to visualize evolution of plasma column with 16-frame interferometer covering range of 220ns) and neutron diagnostics based on TOF method. Space- and time-resolved electron density distributions (especially during decay of plasma column and time of developing MHD instabilities), obtained with a methodology developed for plasmafocus devices [3], resulting in calculating of e.g. linear electron density distributions and total electron number in the pinch [2]. The above - combined with data from set of neutron probes and scintillation detectors [1,4,5] - allowed to estimate such quantities as number of fast deuterons in D(d,n)3He reactions, ion current and energy cumulated in the pinch what was a base for analysis of plasma sheath stability.

The investigations show very important correlations between neutron yield, deuteron and neutron energy and also dynamics of the discharge phenomena.


* The work is supported by the Ministry of Science and Higher Education (MNiSZW), Poland, under Grant No N N202 066140.