Letter to the Editor

THE SCHLIEREN DIAGNOSTIC
OF CURRENT SHEATH WITH UTILIZATION
TIME DELAY OF THE LASER LIGHT BEAM
BY MEANS OF OPTICAL FIBRES[1])

ДИАГНОСТИКА ЭКРАНИРОЖКИ ТОКА ШЛИРЕНА
С ПРИМЕНЕНИЕМ ЗАДЕРЖАВКИ СВЕТОВОГО ИМПУЛЬСЯ
ЛАЗЕРЯ В ОПТИЧЕСКИХ ВОЛОКНАХ

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The development of the inhomogeneities in the current sheath generated by the coaxial accelerator can be studied by the light pulse of the laser, separated into two diagnostic beams, one of them retarded by help of the optical fibre.
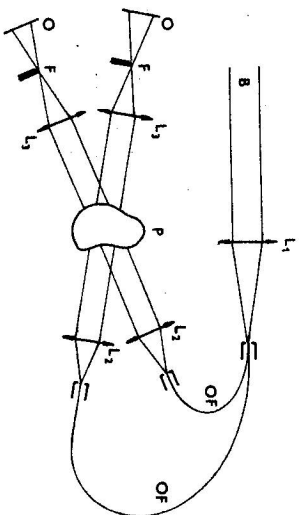

Fig. 1. Scheme of the diagnostic set. B - laser diagnostic beam, L - lenses, OF - optical fibre, P - plasma, F - edge for the Schlieren method, O - fotocamera.

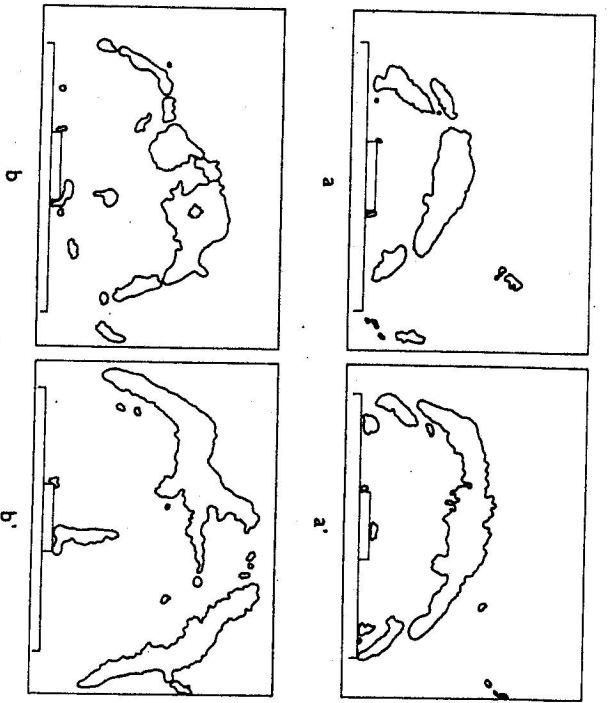[2]) Electrotechnical Faculty, Department of Physics, Czech Technical University, Suchbátarova 2, 166 27 PRAHA 6, CSFR

Fig. 2 The Schlieren picture of the current layer after the breakdown starting. Pictures a, a' correspond to the times 0.8×10^{-6} s, 0.9×10^{-6} s. Pictures b, b' correspond to the times 1.0×10^{-6} s, 1.1×10^{-6} s.

The diameters of the accelerator electrodes are 10 and 27 mm, length 60 mm. The tension of the capacitor bank is 20 kV, the maximum of the current 15 kA and the period of the breakdown 4.0×10^{-6} s.

The scheme of the diagnostic set-up is in Fig. 1. The time delay 10^{-7} s generates the optical fibres (TY 6201020 Tesla Jihlava) with a diameter of 0.2 mm and a length of 20 m and makes the transfer of a sufficient intensity of the light for the photos possible. The discharge current layer photographs were transferred to the computer using a scanner. Boundaries of the areas were determined and outlined by computer (Fig. 2). The velocities of the separated part of the current sheath are $(3-5) \times 10^4 \, \mathrm{ms^{-1}}$.