OPTICAL TOMOGRAPHY
AND ITS APPLICATION
IN PLASMA DIAGNOSTIC

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In the framework of our project we focus on the optical tomography. The aim of this research is to develop not only an experimental apparatus appropriate for visualization of 3D phase objects but, particularly, to find methods for the 3D phase objects reconstruction based on their projections [1, 8].

Tomographic setup - the setup for multidirectional holographic interferometry is described in [3] which enables an observation of phase object by using three holographic plates covering 180 degrees range. On the other hand, we modified the setup in [10], which enables us to use only one holographic plate for tomographic reconstruction. In present setup we used a rotating stand in order to rotate object by predetermined given steps. Moreover, a low power He-Ne laser (up to 20 mW) can be used instead of a high power Ar laser [8] because there is no point in splitting the laser beam.

In the second part of the project: "Laboratory for Optical Tomography and its Application in Plasma Diagnostics" the plasmatron was assembled which produce a plasma useful as inhomogeneous phase object. This plasmatron is water-cooled and burns in nitrogen. Its small size (9 cm x 13 cm) presents an advantage in using in a laboratory. As a plasmatron input, the source for electrical welding was used.

Plasmatron was used in the experiment described in [4]. Up to now the radial space configuration of temperature was determined under the assumption of the axisymmetric plasma. A new experiment where the plasma symmetry will be disturbed is in a stadium of preparation. In their experiment an interference strip distribution will be recorded as measured from two various directions in a real time. Software for evaluations of this projection is prepared already. As a result the three-dimensional temperature distribution in plasma will be established.

The interference pattern was recorded by CCD camera and in the following a signal was transformed by using computer software to 512 x 512 pixels. Knowing phase distribution along a line one can calculate the change of refractive index. The line can be chosen by software.

References:
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