THE EFFECT OF THE NORMAL CURRENT DENSITYAND PLASMA SPATIAL STRUCTURINGIN THE DBD IN ARGON*

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The dielectric barrier discharge is one of the most popular systems for producing low-temperature non-equilibrium plasma. The DBDs can be conveniently operated over a wide range of the discharge parameters. Due to the DBD wide technical application, its spatial structure is of great interest.

The high pressure DBD in argon was simulated using the developed two-dimensional model[1]. Two types of the experimental DBD (of megahertz and kilohertz frequency) were studied. The MHz discharge was uniform over the radius in contrast to the rings formation for the kHz DBD. The developed 2D model is able to describe only the first stage of the filament formation – the system of concentric plasma rings formation. The simulated structuring process obtained in our model is consistent with the experimental observations[2]. The filament formation starts at the boundary of the current channel and extends to its centre.

The effect of the normal current density was obtained numerically in our DBD simulation, both in radiofrequency and kilohertz discharges[3]. Both the effect of normal current density and the filaments formation are caused by the nonstationarity at the current channel boundary. The increase in the discharge current occurs due to increase in the number of rings and as a result in the discharge area. The electron concentration and current density in each ring with the applied voltage increase or drop respectively tend to be the same.

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