Abstract Submitted
for the GEC15 Meeting of
The American Physical Society

Mechanisms of gas breakdown in non-uniform electric field between flat electrodes VALERIY LISOVSKIY[1], RUSLAN OSMAYEV, VLADIMIR YEGORENKOV, Kharkov National University, 61022, Kharkov, Svobody Sq. 4, Ukraine — This paper studies how the electric field non-uniformity and the electron diffusion escape affect the DC gas breakdown between flat electrodes. We registered the breakdown curves of the DC discharge between the electrodes having the radius of $R_e = 6$ mm with the inter-electrode gap values L between 3 and 72 mm in the tubes of inner diameter values of 13 and 56 mm within the nitrogen pressure range p from 0.02 to 120 Torr. We found that the breakdown curves for the gap of 3 mm actually match in the total pressure range, the diffusion escape of electrons to the tube walls playing no role in the gas breakdown process. In a narrow tube the minimum breakdown voltage is constant in the range of $L/R_e \leq 1$ but with the subsequent gap growth it increases linearly in order to compensate for the diffusion loss to the tube walls. For the wide tubes of 56 mm in diameter and for the gap of 72 mm the breakdown curves possess more flat minima and they run in the range of lower breakdown voltage values than one for a narrow tube. The minimum breakdown voltage grows slowly only in the range of $L/R_e > 2$.

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Date submitted: 16 Jun 2015 Electronic form version 1.4