

Abstract Submitted
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Specific Localization of High-Voltage Discharge in Vicinity of Two Gases¹ SERGEY LEONOV, MICHAIL SHURUPOV, JIHT RAS, MICHAIL SHNEIDER, Princeton University, ANATOLY NAPARTOVICH, IGOR KOCHETOV, TRINITI — A subject of paper is the appearance and dynamics of sub-microsecond long filamentary high-voltage discharge generated in atmosphere, and in non-homogeneous gaseous media. Typical discharge parameters are: maximal current 1-3kA, breakdown voltage >100kV, duration 30-100ns, gap distance 50-100mm. The effect of discharge specific localization within mixing layer of two gases is particularly discussed. The second discussed idea is the filamentary discharge movement within a region with concentration gradient of different components. For the short-pulse discharge the physical mechanism appears as the following. The first stage of the spark breakdown is the multiple streamers propagation from the high-voltage electrode toward the grounded one. In case of high-power electrical source those streamers occupy a huge volume of the gas, covering all possible paths for the further development. The next phase consists of the real selection of the discharge path among the multiple channels with non-zero conductivity. Experiments and calculations are presented for Air-CO₂ and Air-C₂H₄ pairs. The effects found are supposed to be applied for lightning prediction/protection, and for high-speed mixing acceleration.

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