Abstract Submitted for the GEC13 Meeting of The American Physical Society

Investigation of positive streamers by double pulse experiments<sup>1</sup> SANDER NIJDAM, Eindhoven University of Technology, The Netherlands, EIICHI TAKAHASHI, National Institute of Advanced Industrial Science and Technology (AIST), Japan, ARAM H. MARKOSYAN, UTE EBERT, Centrum Wiskunde and Informatica, Amsterdam — Streamer discharges are influenced by background ionization and other effects of previous discharges. We have studied the influence of repeating positive streamer discharges by applying two subsequent high voltage pulses with a variable interval (200 ns to 40 ms) between them. The discharges are studied with two ICCD cameras that image the discharge during either the first or the second voltage pulse. Experiments have been performed in a 103 mm point-plane gap at a pressure of 133 mbar in artificial air, pure nitrogen and pure argon. We have found a range of phenomena that depend on the inter-pulse time  $\Delta t$ . For small  $\Delta t$ , (below 1  $\mu s$  for air and nitrogen and below 15  $\mu s$  for argon) the streamers just continue their old paths. At larger  $\Delta t$  the conductivity has decreased too much for such continuation. However, parts of the old paths do glow up again like secondary streamers. At still larger  $\Delta t$  (roughly above 2.5  $\mu s$  for air and 30  $\mu s$  for nitrogen) new channels appear. At first they avoid the entire area of the previous discharge; next they follow the edges of the old channels; then they start to follow the old channels exactly and finally ( $\Delta t > 1$  ms) they become fully independent of the old paths.

<sup>1</sup>This work was supported by JSPS KAKENHI Grant Number 24560249 as well as under FY2012 Researcher Exchange Program between the Japan Society for the Promotion of Science and The Netherlands Organisation for Scientific Research.

> Sander Nijdam Eindhoven University of Technology, The Netherlands

Date submitted: 10 Jun 2013

Electronic form version 1.4