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Analysis of heavy particle processes in low current dc discharge in water vapor¹ JELENA SIVOS, DRAGANA MARIC, NIKOLA SKORO, GORDANA MALOVIC, ZORAN LJ PETROVIC, Institute of Physics, University of Belgrade, Pregrevica 118, 11080 Belgrade — Results presented in our recent paper [1] show that heavy particles – positive ions and fast neutrals (created in charge transfer processes) – can have significant contribution to the processes of excitation at moderate and high reduced electric fields (E/N). In the case of water vapor, hydrogen ions and fast atoms are the most probable candidates, as the lightest products in water vapor discharges. In order to identify dominant heavy species in water vapor discharge, we analyzed discharge parameters in low current Townsend regime. Based on the model developed by Phelps and coworkers in 1993. [2] we were able to estimate transit time of ions from experimentally determined frequency of damped oscillations and parameters of electrical circuit. Furthermore, we compared calculated transit times with transit times of hydrogen ions (H^+ , H_2^+ , H_3^+) [3]. Initial analysis indicates that H_2^+ is dominant ion in the range of moderate E/N (~ 2 kTd). Calculations were done for the discharge initiated at electrode gap of 1.1 cm and pressure (p) x gap (d) of 0.6 Torr \cdot cm, which corresponds to the conditions of the minimum of Paschen curve. In the next step we will extend the analysis to wider range operating conditions. [1] Sivoš J *et al J. Phys. D: Appl. Phys.* **48** (2015) 424011; [2] Petrović Z Lj *et al Phys. Rev. E* 47 (1993) 2825; [3] Phelps A V, *J. Phys. Chem. Ref. Data* 19 (1990) 653

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