Stochastization and pump-out in edge plasma caused by edge localized modes

V. Rozhansky¹, E. Kaveeva¹, M. Tendler²

¹St.Petersburg State Polytechnical University, Polytechnicheskaya 29, 195251 St.Petersburg, Russia
²Alfven Laboratory Royal Institute of Technology, 10044, Stockholm, Sweden

Mechanisms of the currents generation in the edge localized modes (ELMs) filaments are analyzed. It is shown that dipole type currents should flow in the filaments and that these currents are short-circuited through the ambient plasma of the scrape-off layer (SOL). The currents in the filaments are sufficient to produce magnetic field perturbations which create a stochastic layer inside the edge transport barrier region (ETB). The dynamic of penetration of the magnetic field perturbations is analyzed and it is shown that the corresponding time is smaller than the life time of the filaments. At the stage when the ETB region is stochastized by the currents in the filaments the radial electric field becomes less negative or even positive inside the ETB and the onset of outward convective flux takes place. This outward flux could lead to the significant pump-out effect- density decrease in the pedestal regions which is observed in the experiments. After filaments disappear the recovery of the density and temperature takes place due to the transport processes and ionization.