

Modeling of Ion Production in ECR Ion Sources,
G. SHIRKOV, JINR - Electron Cyclotron Resonance (ECR) ion source for highly charged ion production for accelerator and atomic physics applications is a source with the step-by-step ionization by electron impact in the hot plasma. A physical model of ion accumulation and production in the ECR source was developed during several last years. Main statements of the model will be presented. This model based on the balance equations and charged particle confinement in the open magnetic trap. A set of balance equations describes electron and ion generations and losses, all atomic transitions among ion charged states, as well as the electron and ion energy balances in the plasma and connects all main plasma parameters in this way. A library of computer codes based on the equations of presented model is successfully used for the numerical simulation of various regimes of the ECR source operation. Results of simulation have a good qualitative and quantitative coincidence with existent experimental data at main types of present ECR ion sources and enable one to estimate electron density and effective energy in the source plasma. Several examples of recent numerical simulation of experimental distributions of ion charged states will be presented.