

**Numerical Simulation of Space Charge Compensation in Intense Low Energy Proton Beams**, X. FLEURY, J.-L. LEMAIRE, CEA - Bruyeres, France - Self consistent beam dynamics calculations are described that account for space charge compensation in low energy, high intensity proton beams (100 mA, 100 keV) which propagate through a gaseous medium. For this purpose we have used a plasma description of the beam. Kinetics equations which govern the secondary particles behavior are derived in a 1D model. From their expressions we have looked into and discussed the existence of stationary solutions. We have also done numerical work to build up a solution where no assumptions are made on the thermalization of the created neutralizing electrons. The calculation technique consists of an explicit computation code using a PIC method. Relevant parameters are expressed and explain the physical model which is proposed. The diagnostics consist in snapshots in the phase space. They enable to identify the different steps of the space charge compensation mechanism. The transverse ion and electron densities evolution and the momentum spectra of the particles reaching the wall have been obtained as well. At present, it seems possible to make comparisons with experimental results.