Non-Linear Tuning and Halo Transport in Beam Expanders, <u>F. MEOT</u>, T. ANIEL, CEA/DSM/GECA/GT, Laboratoire Saturne, CEA-Saclay -
An analytical treatment of the third, fifth and higher order optics of beam expanders is described. It allows precise tuning of the optical elements of the beam line and the analytical calculation of the non-linear lens strengths necessary for transverse confinement and uniformization at the extended target. The formalism is based on classical optics and deals with co-ordinates and transverse densities in terms of random variables, probability density functions, and their transport. It provides an efficient tool for software optimization of the uniformization at target, considering arbitrary incoming phase-space densities. It also allows the calculation of particle densities in the distribution tails and hence, the evaluation of halo effects and other losses v.s. aperture along the beam line. Applications to the design of a two-dimensional beam expander are given as an illustration.