Computation algorithm

1. Reading of initial parameters from file, preparations for calculation

2. Cycle over time

2.1. Step of integration

2.1.1. If the ion beam is presented by r.m.s. parameters of distribution function
(Step of the integration is substantially larger than revolution period)
Cycle over effects and calculation of the characteristic times of all active effects.
One step in the solution of the system of four differential equations:

$$\begin{cases} \dot{N} = N\sum_j \dfrac{1}{\tau_{life,j}} \\ \dot{\varepsilon}_x = \varepsilon_x \sum_j \dfrac{1}{\tau_{x,j}} \\ \dot{\varepsilon}_z = \varepsilon_z \sum_j \dfrac{1}{\tau_{z,j}} \\ \dot{H}_{lon} = H_{lon} \sum_j \dfrac{1}{\tau_{lon,j}} \end{cases}$$

2.1.2. If the ion beam is presented by array of 3D particles
(Step of the integration is substantially higher than revolution period)
Generation the beam as an array of 6D particles by random generation of phases of betatron and synchrotron oscillations.
Cycle over optic elements, calculations of the right side of the motion equations in each element and cycle over particles in solution of the motion equations.
Calculation of characteristic time of the invariant variation for each particle.
Step over time for each particle and calculations of new values of the motion invariants.