There are several remarks on the dynamics in SAD:

- All transformations in SAD are symplectic up to the round-off errors, except radiations.
- The Hamiltonian describes the motion of particles in the *body* of an element. Some effects at the boundary of an element, such as *fringe field*, are not expressed by the Hamiltonian. SAD treats them by canonical transformations approximating these effects.
- In a case of a linac, where the design momentum p_0 changes along the beam line needs a special treatment.
- The Hamiltonian above analytical solutions in the case of constant field without acceleration, ie., in a solenoid + dipole field. SAD uses such analytic solutions.
- If the field is linear in x and y such as for `QUAD`, and there is no acceleration, the Hamiltonian truncated up to the second order of (x, p_x, y, p_y) has an analytic solution. SAD uses that solution and adds the nonlinear corrections coming from the $\sqrt{\ }$ term by slicing an element. This method gives the exact linear transformation at least around the design orbit.
- Transformations shown in this manual are not necessarily coded as they are. Considerations for round-off errors as well as computing efficiency are taken into account in actual routines.
- Transformations shown here are basically for trackings. `EMITTANCE(EMIT)` and `CALC` may use slightly different but still symplectic ones depending on the element.