STANDARDISED UNITS AND TIME SCALES

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1. Units

For the purpose of comparison of results obtained by different authors, it is very convenient if they share a common system of units. The following system of units seems to find quite wide (if not universal) favour. The units are such that

$$G = 1$$
$$M = 1$$
$$E = -\frac{1}{4},$$

where G is the gravitational constant, M is the total initial mass, and E is the initial energy. The corresponding units of mass, length and time are then

$$\begin{aligned} U_m &= M \\ U_l &= -\frac{GM^2}{4E} \\ U_t &= \frac{GM^{\frac{5}{2}}}{(-4E)^{\frac{3}{2}}} \end{aligned} \tag{1}$$

(cf. Hénon 1972).

The choice for E looks odd, but corresponds to a virial radius R (harmonic mean particle separation) equal to unity for a system in virial equilibrium. In N-body work a somewhat different, actually N-dependent, system is often used (cf. Aarseth 1972), but leads to a crossing time scale proportional to $N^{-\frac{1}{2}}$. This system is also unsuitable for galaxy simulations, where neither the number of stars nor the number of particles in the simulation is relevant to the important dynamical time scales. There are of course stellar dynamical calculations for which the system (1) is unsuitable, e.g. unbound systems or cosmological simulations. And even with regard to systems for which these units are appropriate, it is not suggested that system should be the *only* system in which the results of dynamical calculations are expressed. What could be recommended