

9.3: Some Functions of the Masses

In section 9.5 I am going to consider the motion of two masses, M and m around their mutual centre of mass under the influence of their gravitational attraction. I shall probably want to make use of several functions of the masses, which I shall define here, as follows:

Total mass of the system:

$$\mathbf{M} = M + m. \quad (9.4.1)$$

"Reduced mass"

$$\mathfrak{m} = \frac{Mm}{M+m}. \quad (9.4.2)$$

"Mass function":

$$\mathfrak{M} = \frac{M^3}{(M+m)^2}. \quad (9.4.3)$$

No particular name:

$$m_+ = m \left(1 + \frac{m}{M} \right). \quad (9.4.4)$$

Mass ratio:

$$q = m/M. \quad (9.4.5)$$

Mass fraction:

$$\mu = m/(M+m). \quad (9.4.6)$$

The first four are of dimension M; the last two are dimensionless. When $m \ll M$, $\mathfrak{m} \rightarrow m$, $\mathfrak{M} \rightarrow M$ and $m_+ \rightarrow m$.

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